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Verticalização: Tall Buildings Beyond The Metropolis

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During the 20th century, Brazil's tallest skyscrapers were associated with the country's major metropolitan areas. The process reached its zenith in 1967, when the country's tallest building, Palácio W. Zarzur, was completed in São Paulo, at a height of 170 meters. This fact assumes particular relevance when viewed from a historical perspective: between 1967 and 2014, despite Brazil experiencing intense urban and population growth and an expansion in the construction of high-rise buildings across various cities, no project surpassed the height achieved at that time (see Figure 1).

This pattern was disrupted only in 2014, when Balneário Camboriú, a medium-sized coastal city in the state of Santa Catarina in southern Brazil, began to set new national height records. Subsequent projects, whether under construction

or in development, have subsequently occupied the uppermost echelons among the nation's tallest buildings. At present, seven of Brazil's 10 tallest buildings are in this municipality, including projects that exceed 250, and soon, 500 meters in height.

On initial observation, this phenomenon may appear to be merely a curiosity related to the location of the country's tallest skyscrapers. However, this raises a broader question concerning the manner in which high-rise buildings are being constructed and distributed across Brazil. In the event of the tallest buildings no longer being located exclusively in the country's largest metropolitan areas, what factors can be identified as the reason for this phenomenon? This shift prompts the question of what it reveals about the urban planning instruments responsible for guiding the development of Brazil's urban fabric.

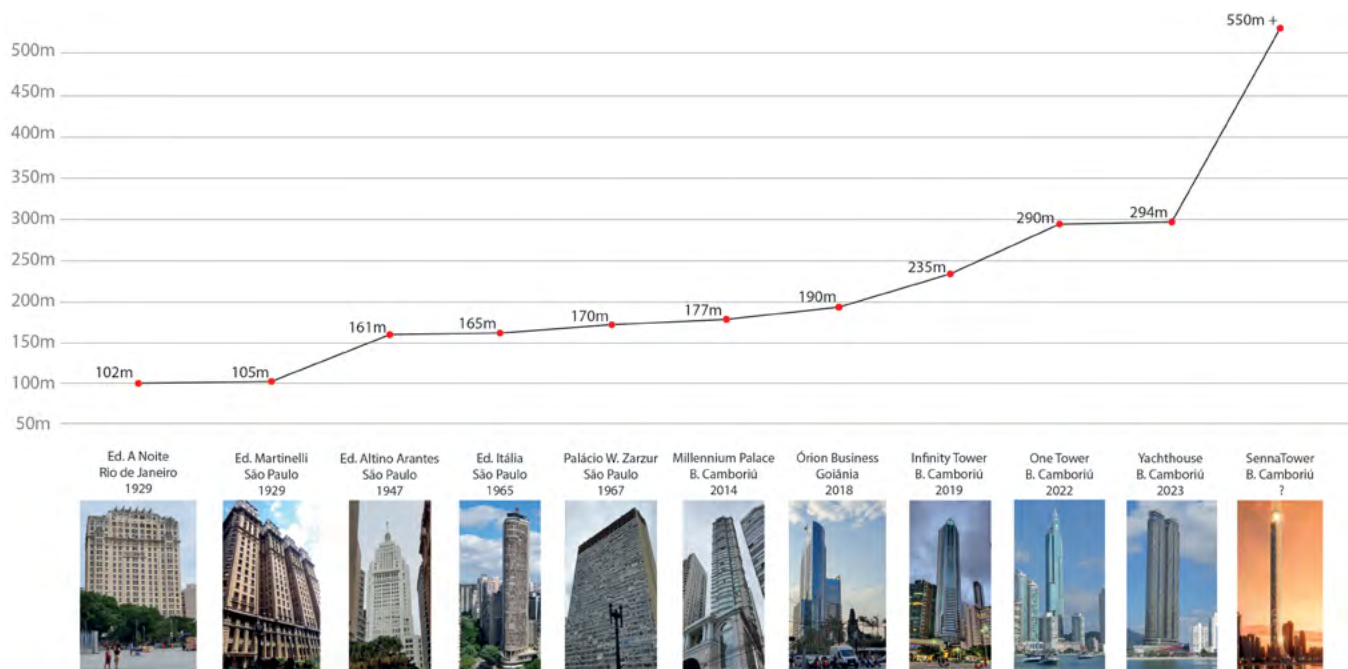


Figure 1. Chart showing the height of the tallest skyscrapers in Brazil throughout history.

"Seven of Brazil's 10 tallest buildings are in Balneário Camboriú, including projects that exceed 250, and soon, 500 meters in height."

The objective of this study is to comprehend the distribution of high-rise buildings across Brazil and the patterns that emerge from this distribution. Throughout the article, this process will be addressed under the term "*verticalização*," a concept that has been extensively utilized in Brazilian literature to describe the construction and proliferation of high-rise buildings in urban areas. The research focuses on the relationship between the different territorial patterns associated with this phenomenon and the urban planning instruments that shape its development.

To this end, cities located in different regions of Brazil were selected for the study, including both the country's major metropolitan areas and other urban centers exhibiting significant patterns of high-rise construction. A comparative analysis of these cases allows for the identification of patterns of concentration, dispersion, and linearity, as well

as combinations thereof. This analysis indicates that the case of Balneário Camboriú should be incorporated as an in-depth study of an urban model characterized by the concentration and intensification of high-rise buildings.

This white paper is organized into six sections. First, the consolidation of the term *verticalização* within the Brazilian context is discussed. Following this is a presentation of the models of *verticalização* that have been identified throughout the country. Subsequently, an analysis is conducted to examine the relationship between zoning and the formation of the urban fabric. This analysis also explores the effects of this process on the homogenization of Brazilian skylines. Subsequently, a case study of Balneário Camboriú is developed. Finally, the text presents concluding remarks and the implications of the results for understanding *verticalização* and urban planning in Brazil.



2.0

Verticalização: A Brazilian Term

A review of the extant literature on high-rise buildings reveals significant differences between the international and Brazilian research. International studies have focused predominantly on the relationships between the skyline, the urban landscape, sustainability, and construction technology. In contrast, Brazilian research has paid greater attention to socio-spatial issues, addressing topics such as real estate development, relationships between the center and the periphery, metropolization, and the mismatches between urban density and its manifestation in the territory.¹ Additionally, the Brazilian literature employs the term *verticalização*, which is specific to the field of language studies, to refer to the transformation of cities caused by the construction of high-rise buildings.

Verticalização can be defined as a process of intensifying urban land use by increasing the number of building stories. This allows for the concentration of larger populations in specific areas of the city. This process is directly linked to the appreciation of urban land value, an increase in construction potential, and higher urban densities in established areas. Concurrently, it necessitates substantial modifications to prevailing urban infrastructure, particularly regarding infrastructure, mobility, traffic flow, and the provision of urban

services. In this sense, *verticalização* signifies more than merely the physical replacement of pre-existing buildings; rather, it denotes a comprehensive process of urban remodeling with the potential to profoundly impact the city's spatial, social, and functional dynamics.²

Verticalização has emerged as a predominant force in the transformation of urban environments, particularly in conjunction with the proliferation of automobiles and the advancement of novel construction technologies. This process entails both positive and negative aspects. On the one hand, *verticalização* refers to the capacity to concentrate the population, intensify the use of urban infrastructure, and consolidate the modern vertical city made possible by elevators and technical advances in civil construction.³ Conversely, the process has the potential to lead to the replacement of pre-existing urban fabrics, the loss of character in established landscapes, the severing of historical ties to the place, and the ongoing need to expand urban infrastructure.²

In the Brazilian context, the term *verticalização* frequently carries a negative connotation associated with the urban impacts resulting from the indiscriminate construction of high-rise buildings. The critique of *verticalização*, therefore,

encompasses not solely the existence of high-rise buildings but, more fundamentally, the manner in which this process has been executed within urban contexts.¹

Nonetheless, *verticalização* can be conceptualized as an irreversible facet of contemporary urbanization, as evidenced by the pervasive presence of high-rise buildings within modern urban landscapes.² In this sense, a significant portion of the complexity associated with *verticalização* in Brazil stems from a limited comprehension of urban planning and the tools capable of effectively guiding the integration of high-rise buildings into the urban landscape.⁴

The ability to understand the environmental, urban, and morphological characteristics of each city is therefore critical to overcoming the negative connotations often associated with high-rise development. The introduction of high-rise buildings necessitates studies capable of relating different urban morphologies to landscape characteristics and existing urban spaces. However, this consideration has rarely consistently guided the processes of

verticalização observed in Brazilian cities over the past few decades.²

The Loss of Urban Character

Throughout the 20th century, the rapid population growth in medium-sized and large Brazilian cities necessitated swift transformations in their urban structures, primarily to accommodate the population increase within a short period of time. In this context, high-rise development emerged as a strategy for creating built space, driven by the pursuit of enhanced efficiency in the utilization of urban land and the optimization of existing infrastructure. Consequently, novel morphologies began to emerge in Brazilian cities, profoundly altering preexisting urban fabrics and transforming not only the built form but also the way urban space is utilized and experienced (see Figure 2).²

These transformations did not occur merely through the selective replacement of buildings; rather, they involved broader changes in the spatial configuration of cities. The advent of vertical development engendered a profound shift in the prevailing land use patterns, thereby



Figure 2. Landscape in transformation, both at ground level and on the horizon, in Goiânia, 2022, with the construction of new high-rise buildings.



Figure 3. Among the tallest buildings in São Paulo, two are transforming the landscape of the Tatuapé neighborhood, located 8 km from the city center: at left, Platina 220 (171 m) and at right, Figueira Altos do Tatuapé (168 m).

altering the relationship between open and built spaces, lot configurations, and the intensity of urban occupation. Concurrently, the densification resulting from the construction of high-rise buildings necessitated successive urban infrastructure interventions, including avenues, overpasses, bridges, and transportation systems, profoundly altering preexisting urban structures.² Consequently, novel urban landscapes came into being as part of a continuous process of urban transformation, frequently involving the replacement of historically established configurations and the disruption of spatial relationships associated with memory, culture, and urban identity (see Figure 3).

The process of *verticalização* has also contributed to the transformation of peripheral neighborhoods into areas that increasingly resemble city centers.⁴ Neighborhoods that were previously distinguished by organic growth, small-scale construction, and predominantly local uses have gradually begun to develop new centers associated with population growth and urban densification. *Verticalização* is frequently evidenced by the "springing up" of buildings along urban blocks, which gradually replaces the horizontal fabric of the urban landscape with larger buildings. This phenomenon promotes successive changes in the urban scale of neighborhoods.² The transformation of the landscape is characterized by two distinct



Figure 4. Aerial view of São Paulo. Vertical sprawl expanding across the city's territory.

processes: the direct replacement of pre-existing buildings and the gradual superimposition of different generations of construction, marked by successive increases in height and urban density.

The ongoing transformation of the urban landscape has the potential to erode the spatial landmarks historically associated with the identity of neighborhoods and urban regions. In this sense, the loss of urban memory can also be understood as a loss of morphological characteristics and atmospheres that were previously firmly established in the collective imagination of the population. In the Brazilian context, various authors have established a correlation between the *verticalização* of urban

development and the progressive loss of character in previously identifiable local urban landscapes. This phenomenon has the effect of altering the relationship between the population, urban memory, and the perception of the city.

The "Metropolization" of High-Rise Development in São Paulo

The evolution of high-rise development in São Paulo can be understood by examining the various periods of urban transformation that have occurred since the emergence of the first buildings equipped with elevators in the state capital. Beginning in the 1950s, particularly following 1957, the proliferation of high-rise buildings across urban areas accelerated, a phenomenon concomitant with construction restrictions imposed by prevailing legislation. This development led to an increased demand for more affordable land in suburban neighborhoods, external to the established downtown area. In the subsequent decades, population growth and enhanced urban planning oversight of building lots further accelerated the proliferation of vertical development, extending beyond the city limits and disseminating high-rise buildings to neighboring cities within the metropolitan region.⁵

Consolidation is a process of *verticalização*-driven "metropolization," characterized by the blurring of municipal boundaries and the spread of high-rise buildings throughout the metropolitan region. In this context, *verticalização* becomes dispersed and pervasive throughout the urban territory, while non-vertical voids persist in the proximity of central areas. The phenomenon of "*desverticalização*" is characterized by intense real estate development that does not necessarily result in greater effective urban density. However, it contributes to the formation of a sprawling city marked by the territorial spread of *verticalização* (see Figure 4).⁵

The Loss of Character in Established Neighborhoods in Rio de Janeiro

In Rio de Janeiro, high-rise development exhibits distinct characteristics compared to other Brazilian state capitals, particularly due to the rapid expansion of high-rise buildings into neighborhoods located far from the city center, a trend that began in the early stages of this process, as early as the 1920s.

In contrast to the development patterns observed in São Paulo, *verticalização* in Rio de Janeiro emerged as a prominent feature of urban development in the southern zone from an early stage, contributing to the shaping of urban landscapes that have become closely associated with the city's image over the subsequent decades.⁶ During this period, the development of urban architecture was governed by decrees that established distinct height limits for each neighborhood, without necessitating setbacks. While certain areas permitted only four- or five-story buildings, others accommodated structures between 10 and 15 stories. The city center was the only region where heights exceeding 50 meters were permitted.⁷

Beginning in the 1960s and 1970s, in response to criticisms regarding high population density and the urban forms resulting from high building potential, urban regulations gradually began to modify the building volumes in the city. Initially, the construction of taller buildings was permitted, provided that the prescribed side and front setbacks from the sidewalk were adhered to.⁷ Subsequently,

the increasing demand for parking spaces in the established neighborhoods of the southern zone led to the adoption of the tower-on-podium typology. In this typology, side setbacks are maintained only on the tower, while the podium remains aligned with the lot's side boundaries.⁸ Conversely, in the central region, the scarcity and diminutive scale of plots engendered the erection of slender edifices exceeding 30 stories in height, thereby effecting a transformation in the area's prevailing scale.⁶

Against this backdrop, successive morphological changes have significantly transformed the spatial configuration that had become firmly established in the collective imagination of Rio de Janeiro. Consequently, critiques of the *verticalização* process began to concentrate not solely on the presence of tall buildings, but predominantly on the various building typologies that were introduced over time. These alterations disconnected façade alignments, disrupted spatial relationships established at the pedestrian scale, and transformed the historical relationship between the city and the natural landscape (see Figure 5).⁶



Figure 5. A blade-like building breaking the established height limits in downtown Rio de Janeiro.

In Porto Alegre, criticism of the process of *verticalização* focuses on the successive changes in building typology and morphology that have been brought about by the various urban planning regulations that have been adopted over time.^{9, 10} The process of constructing high-rise buildings in the capital of Rio Grande do Sul can be understood in two distinct phases. Firstly, there was a consolidation of tall buildings, favored by population growth and permissive legislation. Secondly, there was an intensification of urban planning restrictions, which began to result in lower buildings with greater setbacks.⁹

During the initial period, urban regulations were founded on building height limits associated with street widths. Subsequently, volumetric gradations were incorporated, commencing at specific heights. Consequently, the development of buildings with high construction potential ensued, which, even today, remain among the tallest in the city.¹⁰ However, the absence of lateral setbacks, the reduced lighting of the *façades*, and the high density produced by this model have been criticized.^{9, 10} This criticism has contributed to the strengthening of a new urban design concept associated with the isolated building on the lot, understood at that time as a solution capable of providing better conditions for urban livability.

During the second period, opposition to previously used building typologies intensified with each revision of urban planning regulations, increasing the setbacks between buildings and reducing the permitted building coverage on urban lots.⁹ Consequently, the volumetric unpredictability of the new buildings transformed the old blind gables into permanent features of Porto Alegre's urban landscape, while the new spatiality produced by buildings surrounded by setbacks led to the discontinuity of urban alignments, the visual and morphological disruption of the street, and a growing blurring of the boundaries between public and private spaces.¹⁰

In this context, criticism of high-rise development is increasingly shifting away from a focus on technical issues related to urban livability and is taking on an ideological dimension as well. This shift is marked by a growing aversion to high-rise buildings and the association of so-called

"Regulations imposing building height limits with volumetric gradations have been criticized for the absence of lateral setbacks, reduced lighting of the *façades*, and high density."

"skyscrapers" with the deterioration of the city's environmental and functional quality. The outcome of this phenomenon is that substantial metropolitan areas remain stagnant under the constraints imposed by restrictive legislation, impeding urban renewal initiatives and constraining the more rational utilization of the city's expanding regions (see Figure 6).¹⁰

The Decentralization of Belo Horizonte

Planned from its inception, Belo Horizonte has exhibited unique characteristics in its urban growth process when compared to other Brazilian state capitals. In contrast to cities that developed through gradual, unplanned expansion, the capital of Minas Gerais exhibited a distinct growth pattern, expanding from the periphery toward the center, as initially conceived in its planned urban layout.¹¹

The initial high-rise district emerged in the vicinity of Sete de Setembro Square, a significant nexus formed by the convergence of Afonso Pena and Amazonas avenues, adjacent to the boundaries of the city's planned road network. Between the 1940s and 1960s, the period experienced intense population growth, which led to the construction of tall residential and commercial buildings. These buildings were subject to urban height limits, contributing to the consolidation of the vertical landscape of central Belo Horizonte.¹¹ However, the criticism regarding residential densification in the downtown area—originally conceived as a



Figure 6. A blank wall, seemingly “frozen” in the view from the Otávio Rocha viaduct in downtown Porto Alegre.

predominantly commercial zone—contributed to the expansion of high-rise development toward the southern part of the city, associated with higher-value areas and the implementation of new urban planning regulations.

In the decades that followed, high-rise development spread rapidly throughout the rest of the urban area, while the central region began to show signs of infrastructure and service saturation, particularly in relation to transportation and urban mobility. In response to these challenges, new urban planning regulations were implemented with the aim of decentralizing activities and promoting the formation of new service hubs in different parts of the city.¹¹ However, the results obtained deviated from the initial objectives. The implementation of urban planning instruments, with a predominant focus on the capacity for densification, has contributed to the relative homogenization of urban areas. This process has occurred through the disregard of pre-existing spatial relationships and the abandonment of conventional parameters of urban design, including building heights and

construction typologies. Consequently, a dispersed *verticalização* has emerged, characterized by the erection of analogous structures in disparate regions of the city, frequently detached from the distinctive attributes of the locale and the prevailing urban topography (see Figure 7).¹¹

As evidenced by the cases cited, the initial process of *verticalização* was concentrated in the first half of the 20th century. This phenomenon was driven by two factors. Firstly, there was the ideal of building ever higher. Secondly, there were urban planning regulations that imposed few restrictions on the height and size of buildings. During this period, a logic of urban growth and consolidation took hold, marked by the pursuit of a specific urban image associated with progress and “metropolization.”⁹

Concurrently, criticism has emerged concerning the high population density resulting from these urban layouts, the reduced sunlight on streets and building façades, and the loss of character in historic districts. In an effort to address these concerns, urban planners have gradually



Figure 7. "Decentralization" of *verticalização* in Belo Horizonte. Tall buildings are beginning to occupy the hills bordering the city of Nova Lima in 2009.

implemented restrictions on the construction of tall buildings in central areas, both in terms of size and height. This has led to encouragement of high-rise development in suburban neighborhoods on the outskirts of established city centers. This phenomenon was further exacerbated by population growth and the intensification of the automotive industry during the 1950s, leading to the expansion of urbanized territory and the acceleration of urban dispersion.⁵

In the subsequent decades, novel challenges emerged, and efforts to address them frequently proved inadequate. The term "*desverticalização*," coined by Somekh, refers to the dispersed growth of vertical development across urban landscapes, characterized by the sporadic emergence of high-rise buildings in various neighborhoods. Consequently, *verticalização* gradually becomes dispersed throughout the urban fabric, manifesting as a proliferation of new buildings distributed across the territory.⁴

"Criticism has emerged concerning *verticalização* in Belo Horizonte, specifically the high population density, reduced sunlight on streets and building façades, and the loss of character in historic districts."



3.0

Models of *Verticalização* in The Urban Territory

An analysis of *verticalização* in the Brazilian context reveals that it does not occur uniformly. Rather, it manifests in distinct forms depending on territorial conditions, real estate dynamics, and current urban planning instruments. In this sense, *verticalização* can be understood through different patterns of distribution and implementation across the territory. These patterns directly influence the resulting urban form and the way density manifests itself in cities.

Verticalização must therefore be considered more than an isolated phenomenon; rather, it constitutes a spatially structured process, the organization of which reveals specific logics of land use. These logics are expressed not only in the height of buildings, but primarily in the way they are distributed within the urban fabric, in the relationship between buildings and lots, and in the articulation between city blocks, streets, and public spaces. The analysis of these patterns enables us

to transition from an examination of their effects to a comprehension of their structural underpinnings.

From this perspective, we propose the identification of three primary models of *verticalização* in Brazilian urban areas: the concentrated model, the dispersed model, and the linear model (see Figure 8). It is imperative to recognize that these models should not be interpreted as rigid or mutually exclusive categories. Instead, they should be regarded as predominant forms of spatial organization that can coexist and overlap in various urban contexts. Nevertheless, distinguishing between these categories analytically facilitates comprehension of how divergent spatial arrangements yield disparate outcomes in terms of density, urban form, and the experience of the city.

Despite the presentation of these models separately for analytical purposes, urban reality often manifests

"Verticalização is more than an isolated phenomenon; rather, it constitutes a spatially structured process, the organization of which reveals specific logics of land use."

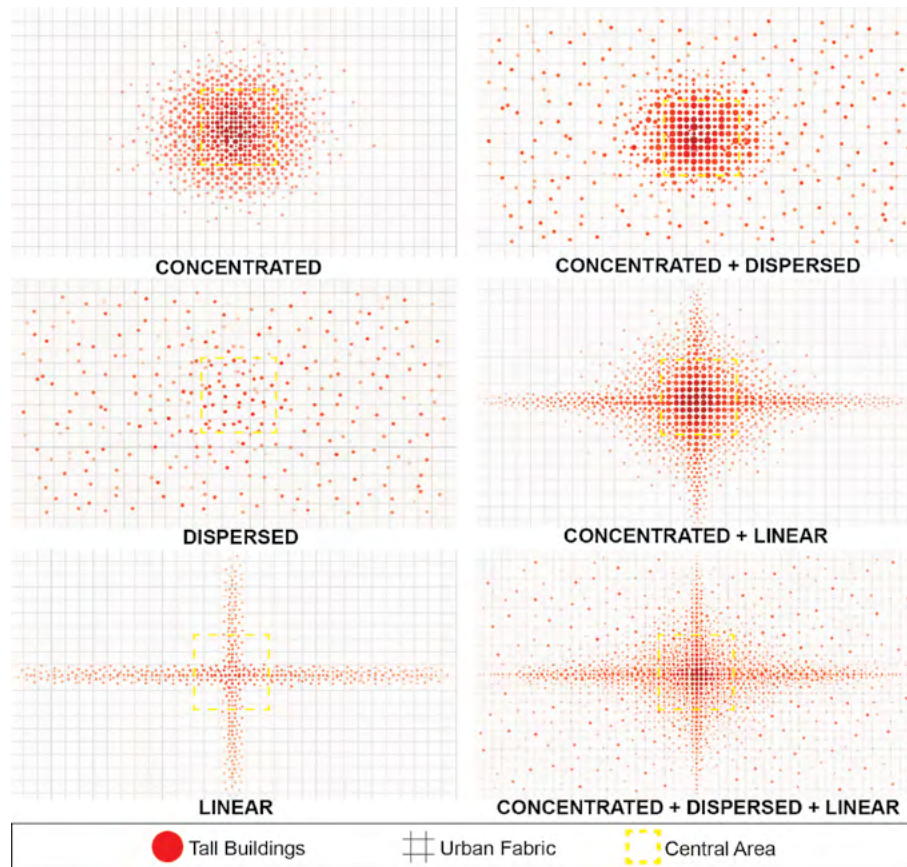


Figure 8. Diagrams illustrating *verticalização* models.

hybrid configurations resulting from the combination of different patterns of territorial distribution. In many Brazilian cities, processes of concentration, dispersion, and linearity coexist simultaneously, producing complex urban forms that are difficult to understand using a single explanatory model.

Analysis Methodology

In order to comprehend the varied patterns of spatial distribution of vertical development in

Brazilian cities, a methodology was developed. This methodology was based on two analyses: spatial analysis and comparative analysis of buildings classified by height.

The identification of buildings was achieved through the integration of three complementary databases: the Skyscraper Center,^a which is maintained by the Council on Vertical Urbanism (CVU); the Global Building Atlas^b v1.0, which was developed by Earth System Science Data (ESSD); and the 3D-GloBFP^c

^a The data from the Skyscraper Center was provided directly by the Council on Vertical Urbanism (CVU) team and includes the geographic location (coordinates) and height of the buildings registered on the platform.

^b The Global Building Atlas (GBA) is a global, georeferenced dataset that estimates building heights based on automated classification using satellite imagery. The geographic location and estimated height of the buildings were extracted. This iteration, designated as version 1.0, is currently in the nascent stages of consolidation. Subsequent updates are anticipated to augment the scope and enhance the precision of the estimates furnished.

^c The 3D-GloBFP data set comprises a global database of "building footprints," with height estimates derived from digital surface models and remote sensing techniques. The geographic location and estimated height of each building were extracted.

model, which was also produced by ESSD. Collectively, these databases furnish georeferenced data on the location, height, and characteristics of buildings, thereby facilitating the development of a territorial representation of *verticalização* in diverse urban centers.

For each municipality analyzed, buildings were classified into height categories, thereby enabling the identification of not only the presence of the tallest buildings but also the distribution of the entire vertical building stock. The data were subsequently spatialized in a Geographic Information System (GIS) environment, enabling the simultaneous visualization of the location, density, and concentration of high-rise buildings. In addition to cartographic representation, the absolute numbers and relative proportions of buildings in each height category were calculated, thus enabling comparisons between cities with different territorial sizes, populations, and degrees of *verticalização*.

The objective of the analysis was not to quantify building density or population; rather, it was to comprehend the distribution of buildings within the urban area. Consequently, the emphasis is shifted towards the examination of spatial patterns in vertical development, as opposed to being confined to the mere number of existing buildings in each city.

Based on the maps produced, summary diagrams were created that allow us to abstract the specific morphological characteristics of each municipality

and highlight the predominant patterns of territorial distribution. This graphical simplification facilitates the comparison of cities of different scales and urban contexts, thereby enabling the identification of common trends and local particularities.

A comparative analysis of the maps and diagrams yielded recurring patterns in the spatial distribution of high-rise buildings (see Table 1). While each city is characterized by its own unique historical, geographical, and urban planning constraints, the graphical representation of the data facilitates the recognition of structural similarities among seemingly distinct processes of *verticalização*. This comparative analysis demonstrates the impact of distinct spatial configurations on the formation of urban landscapes and the distribution of high-rise buildings across a given territory.

The cities selected for analysis were chosen to represent a range of urban contexts and Brazil's five geographic regions. São Paulo and Rio de Janeiro are representative of the Southeast, in addition to being cities that have been the focal points of Brazil's *verticalização* throughout the 20th century. The municipalities of Curitiba, Goiânia, Fortaleza, and Belém are geographically located in the South, Midwest, Northeast, and North, respectively. The composition of this sample enables the observation of how *verticalização* manifests itself in distinct urban contexts and the assessment of the existence of recurring patterns in the territorial distribution of high-rise buildings.

City	Height Type	0–15 m	15–30 m	30–60 m	60–100 m	100–150 m	>150 m	Proposed / Under Construction (100 m+)	Total
São Paulo	Count	3,557,451	37,473	12,437	1,392	203	31	26	3,609,013
	Proportion	98.57%	1.04%	0.34%	0.04%	0.01%	0.00%	0.00%	100.00%
Rio de Janeiro	Count	563,942	12,955	1,327	39	36	3	2	578,304
	Proportion	97.52%	2.24%	0.23%	0.01%	0.01%	0.00%	0.00%	100.00%
Curitiba	Count	810,937	5,130	1,021	137	31	3	3	817,262
	Proportion	99.23%	0.63%	0.12%	0.02%	0.00%	0.00%	0.00%	100.00%
Goiânia	Count	801,737	2,647	997	257	203	17	44	805,902
	Proportion	99.49%	0.33%	0.12%	0.03%	0.03%	0.00%	0.00%	100.00%
Fortaleza	Count	702,968	2,766	568	740	33	14	29	707,118
	Proportion	99.42%	0.39%	0.08%	0.10%	0.00%	0.00%	0.00%	100.00%
Belém	Count	350,764	2,073	558	38	27	0	4	353,464
	Proportion	99.24%	0.59%	0.16%	0.01%	0.01%	0.00%	0.00%	100.00%

Table 1. Number and distribution of buildings of varying heights across six key cities in Brazil.

Rather than merely examining isolated cases, the comparison among these cities seeks to identify common characteristics of the Brazilian *verticalização* process.

The São Paulo Model

Among the cities that were analyzed, São Paulo exhibited the most complex pattern of vertical development across its territory. The cartographic representations reveal the concurrent existence of concentrated, dispersed, and linear models, thereby establishing an urban framework characterized by the superimposition of disparate patterns of high-rise development across the expanse of the territory.

A spatial analysis reveals a significant concentration of high-rise buildings in the city center, however, high-rise buildings are distributed throughout much of the urbanized area. This territorial dispersion is especially evident in the extent of São Paulo's vertical footprint, which extends well beyond the boundaries of the historic core, and even the municipal core of the city. Concurrently, emerging urban corridors can be identified, forming linear axes of vertical development that connect disparate sectors of the city.

The quantitative data substantiates this interpretation. While most identified buildings, 98.57%, have a maximum height of 15 meters, it is noteworthy that São Paulo accounts for approximately 1.43% (51,536) of buildings that exceed this height. This percentage is particularly significant in the context of the city's overall size. Moreover, the observation of 260 edifices surpassing 100 meters in height underscores the city's capacity to concurrently possess structures of substantial height, and the extensive array of high-rise development dispersed across its expanse.

The combination of concentration, dispersion, and linearity sets São Paulo apart from the other cities analyzed, making it the most representative example of the coexistence of multiple models of vertical development within a single urban context (see Figure 9).

"São Paulo is the most representative example of the coexistence of multiple models of vertical development within a single urban context."

The Rio de Janeiro Model

The city of Rio de Janeiro exhibits a pattern of vertical development that differs from that observed in the city of São Paulo. While the coexistence of concentrated and dispersed models is also a possibility, the distribution of high-rise buildings is more strongly influenced by the physical characteristics of the territory (see Figure 10).

The maps reveal the presence of significant concentrations of tall buildings—ranging from 15 to 60 meters and numbering 14,282—in specific areas of the city, particularly along the most sought-after sections of the coastline and in well-established parts of the urban fabric. Concurrently, there is a dispersion of buildings into other neighborhoods within the municipality, forming discontinuous vertical clusters distributed throughout the territory.

However, in contrast to the context of São Paulo, the urban development of high-rise structures in this locale is subject to more stringent constraints imposed by the landscape. The topography of the area, including hills, lagoons, and conservation areas in conjunction with the ocean, serves to impede the propagation of urban development, thereby engendering a less fragmented spatial distribution of high-rise buildings. However, in areas where the territory is not constrained by geography, high-rise development appears scattered across the city's landscape.

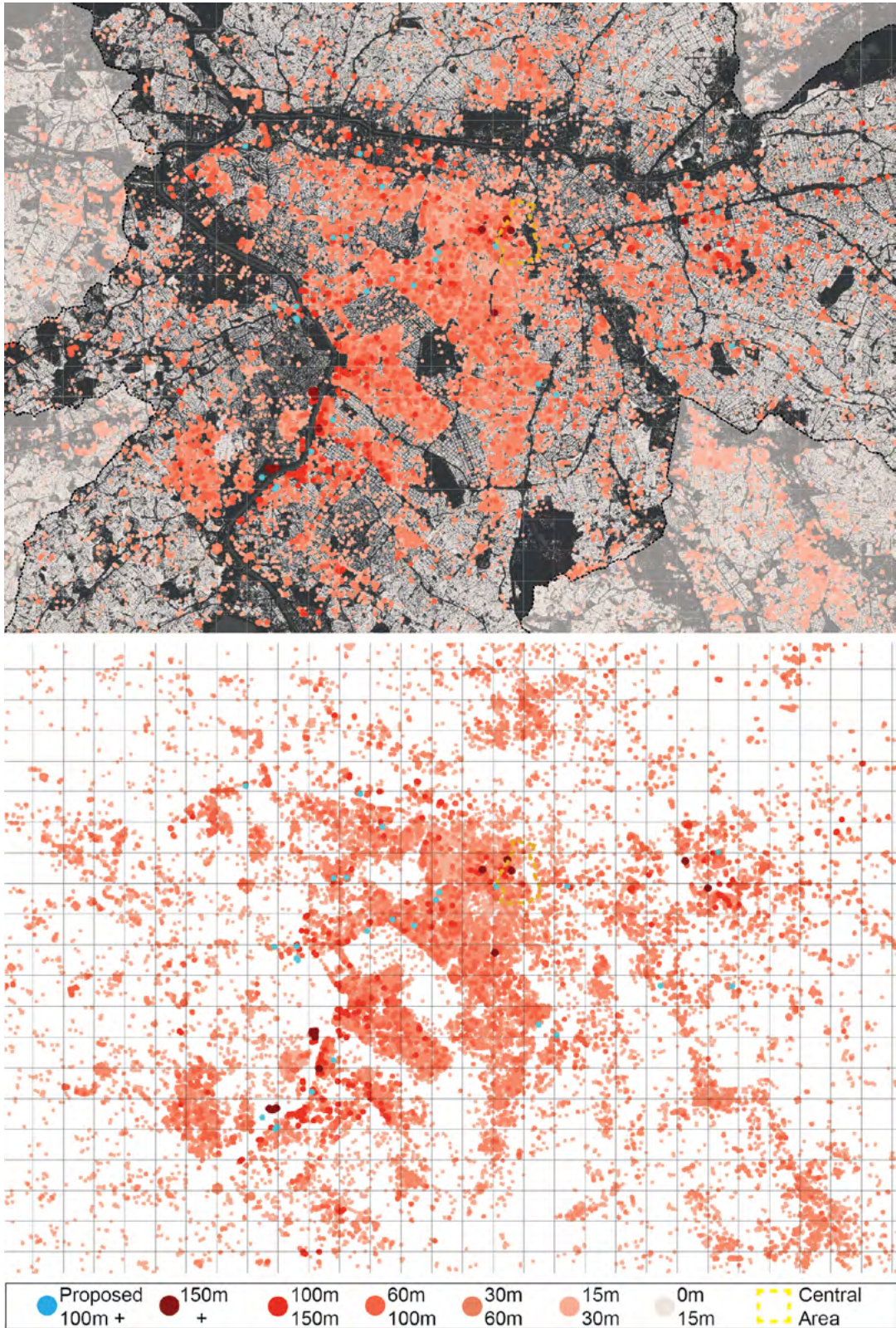


Figure 9. Distribution of buildings of varying heights across the municipality of São Paulo.

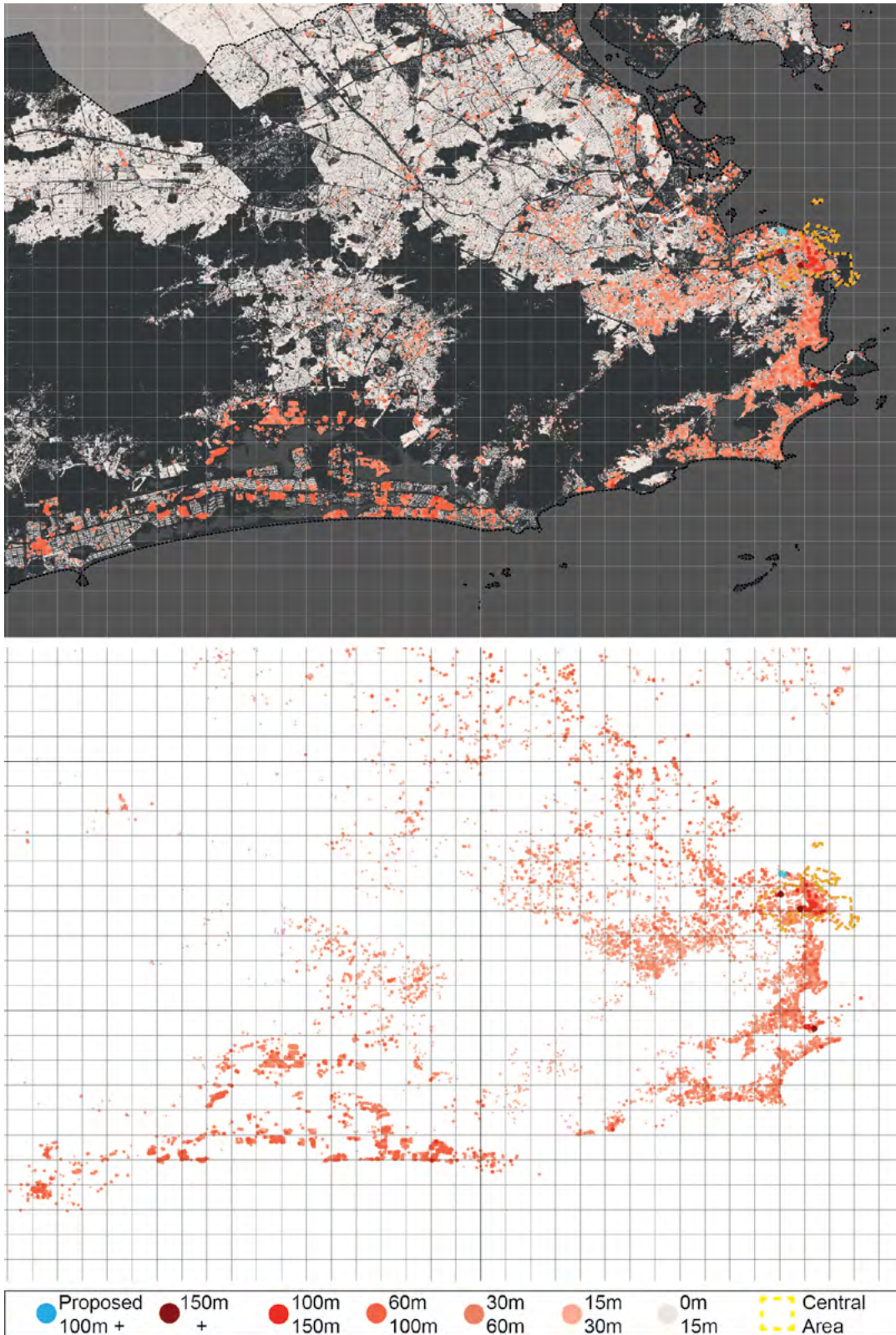


Figure 10. Distribution of buildings of varying heights across the municipality of Rio de Janeiro.

The quantitative data demonstrate that 97.52% of the identified buildings have a maximum height of 15 meters, while approximately 2.49% exceed that height. This is the second-highest percentage among the cities analyzed, indicating a significant presence of high-rise buildings distributed throughout the urban area. However, as previously mentioned, a considerable number of buildings range from 15 to 60 meters in height, while structures exceeding 100 meters in height account for a mere 0.01% (39) and are predominantly situated within the central region of Rio de Janeiro.

A comprehensive analysis encompassing maps, diagrams, and quantitative data enables the classification of Rio de Janeiro as a composite model of concentrated and dispersed *verticalização*. Despite the presence of substantial concentrations of high-rise buildings, the implementation of vertical expansion into diverse sectors of the city has led to a more intricate territorial configuration than that observed in models that exclusively concentrate development.

The Curitiba Model

A notable distinction emerges in the vertical development exhibited by Curitiba, which contrasts with the observed patterns in previously analyzed cities. While an initial concentration of high-rise buildings can be identified in the central region, the maps indicate that the expansion of vertical development occurred predominantly along specific axes within the urban area, resulting in a combination of the concentrated and linear models.

In contrast to the patterns observed in cities with dispersed high-rise development, high-rise buildings in Curitiba tend to follow clearly delineated structural corridors. The diagrams illustrate the formation of linear bands that radiate out from the central area, thereby establishing a territorial organization closely linked to the city's main urban axes.

The quantitative data demonstrate that 99.23% of the 817,262 identified buildings have a maximum height of 15 meters, while a mere 0.77% (6,322) exceed that height. Despite the relatively low

proportion of tall buildings compared to other cities analyzed, the spatial distribution of these buildings reveals a largely organized territorial pattern, in which they are concentrated primarily along specific corridors, rather than being scattered throughout the entire urban area.

This configuration demonstrates that the intensity of *verticalização* is not necessarily associated with its territorial dispersion. In the case of Curitiba, despite the relatively modest proportion of buildings exceeding 15 meters in height, the spatial distribution of tall buildings gives rise to a distinctly identifiable urban structure, marked by the coexistence of a verticalized central core and linear axes of vertical growth.

Among the cities examined, Curitiba stands out as a prime example of the strategic *verticalização* of urban development along designated corridors. This approach is in stark contrast to the predominantly dispersed patterns observed in other Brazilian state capitals (see Figure 11).

The Goiânia Model

Goiânia exhibits a predominantly dispersed pattern of vertical development. In contrast to the previously analyzed cities, there is an absence of a clearly defined dominant vertical core from which vertical development propagates throughout the urban area. High-rise buildings are distributed across different sectors of the city, forming multiple centers of vertical development without any single major concentration.

The maps demonstrate that high-rise development is dispersed throughout much of the urbanized area, exhibiting varying degrees of intensity. The highest concentration of high-rise buildings is found in the neighborhoods west of the central region, extending toward the southern part of the city and forming an urban continuum marked by the presence of taller buildings. Additionally, a second area with a higher concentration of high-rise buildings can be observed on the eastern side of the territory, associated with the recent real estate appreciation in that region. Despite the preponderance of high-rise buildings in these areas, they fail to constitute a singular or dominant

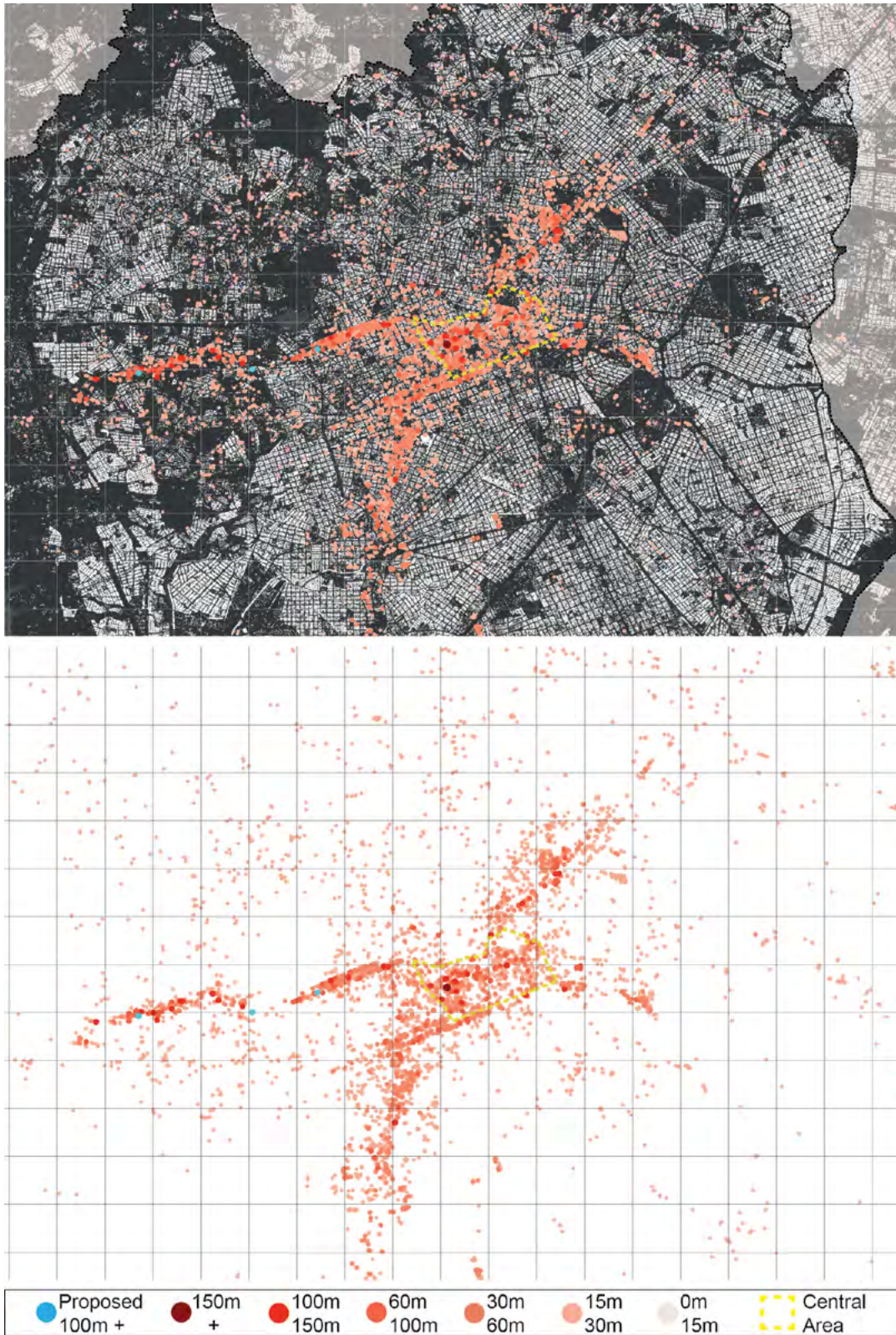


Figure 11. Distribution of buildings of varying heights across the municipality of Curitiba.

concentration that would enable the delineation of a concentrated model (see Figure 12).

The quantitative data substantiates this interpretation. A mere 0.51% (4,121) of the identified buildings exceed 15 meters in height, and these structures are dispersed throughout various sectors of the city, without exhibiting a pronounced concentration.

An analysis of proposed and under-construction projects lends support to this interpretation. A total of 43 buildings with a height exceeding 100 meters were identified as being in the design or construction phase, primarily situated in the western, southern, and eastern regions of Goiânia.

The geographical distribution of existing buildings and developments under construction indicates that high-rise construction in Goiânia occurs across multiple urban centers, with no single major concentration dominating the landscape. This configuration reflects a predominantly dispersed model, distinguishing the capital of Goiás from cases where high-rise construction is organized around clearly defined hubs.

The Fortaleza Model

The Fortaleza model demonstrates a predominantly dispersed pattern of high-rise development, in which the distribution of high-rise buildings is closely linked to the utilization of the waterfront. The highest concentration of these buildings is found in neighborhoods facing the sea, where some of the city's most valuable areas are concentrated.

The maps illustrate a higher concentration of high-rise development along the northern coastal strip (see Figure 13). However, as urbanization progresses inland, the high-rise development becomes increasingly dispersed, distributed in a fragmented manner across different neighborhoods of the city. This configuration is designed to impede the emergence of a predominant concentration with the capacity to orchestrate high-rise development on a municipal scale.

The quantitative data reveals a particular characteristic of Fortaleza's vertical development.

Despite the low proportion of buildings taller than 15 meters, the city has more buildings in the 60- to 100-meter range (0.10% or 740 buildings) than in the 30- to 60-meter range (0.08% or 568 buildings). This finding indicates a robust correlation between real estate development and large-scale projects, with a notable concentration of these projects occurring in waterfront neighborhoods.

An analysis of proposed and under-construction projects reveals a recent shift in the scale of local construction. A total of 28 buildings with height exceeding 100 meters were identified as being in the design or construction phase, a figure that is notably higher than the current inventory in this category. The locations of these projects align with the observed pattern of buildings already constructed, thereby maintaining the strong relationship between high-rise development and the waterfront.

The Belém Model

Among the cities examined, Belém displays the most dispersed pattern of vertical development identified in this study. The maps reveal the absence of significant concentrations of high-rise buildings or urban axes capable of structuring vertical development spatially (see Figure 14). The buildings are dispersed throughout various sectors of the city, resulting in a diffuse vertical pattern devoid of a clearly dominant core.

This characteristic becomes particularly pronounced when compared to the other cases classified as "dispersed." While Goiânia features areas with a higher concentration of high-rise buildings in the western and southern sectors of the city, Fortaleza concentrates a significant portion of its high-rise development along the waterfront, Belém lacks equivalent areas of concentration. Even in regions with a greater presence of high-rise buildings, the distribution remains fragmented and scattered when viewed on a municipal scale.

The quantitative data substantiates this interpretation. The city of Belém is notable for its substantial number of buildings, with a significant

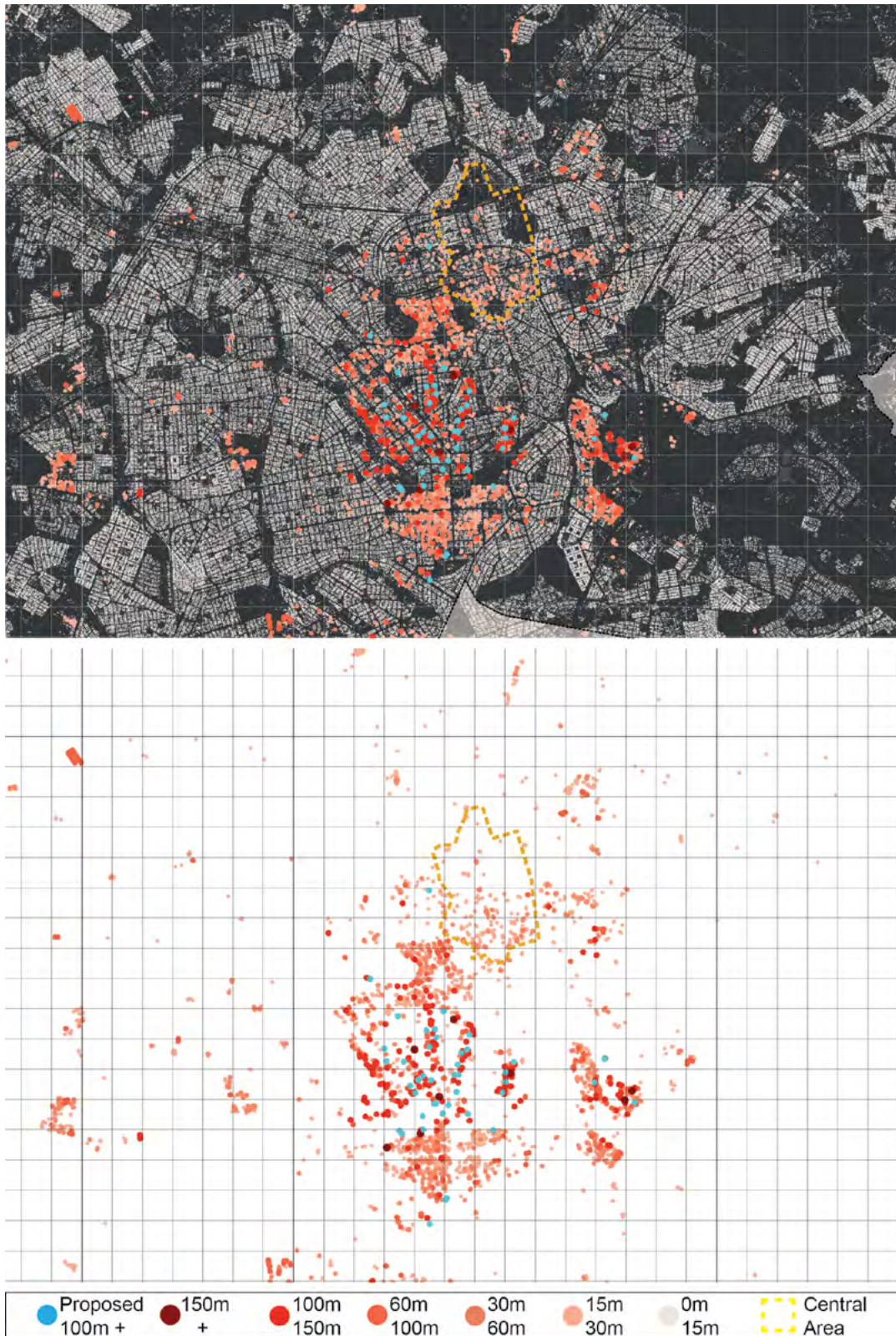


Figure 12. Distribution of buildings of varying heights across the municipality of Goiânia.

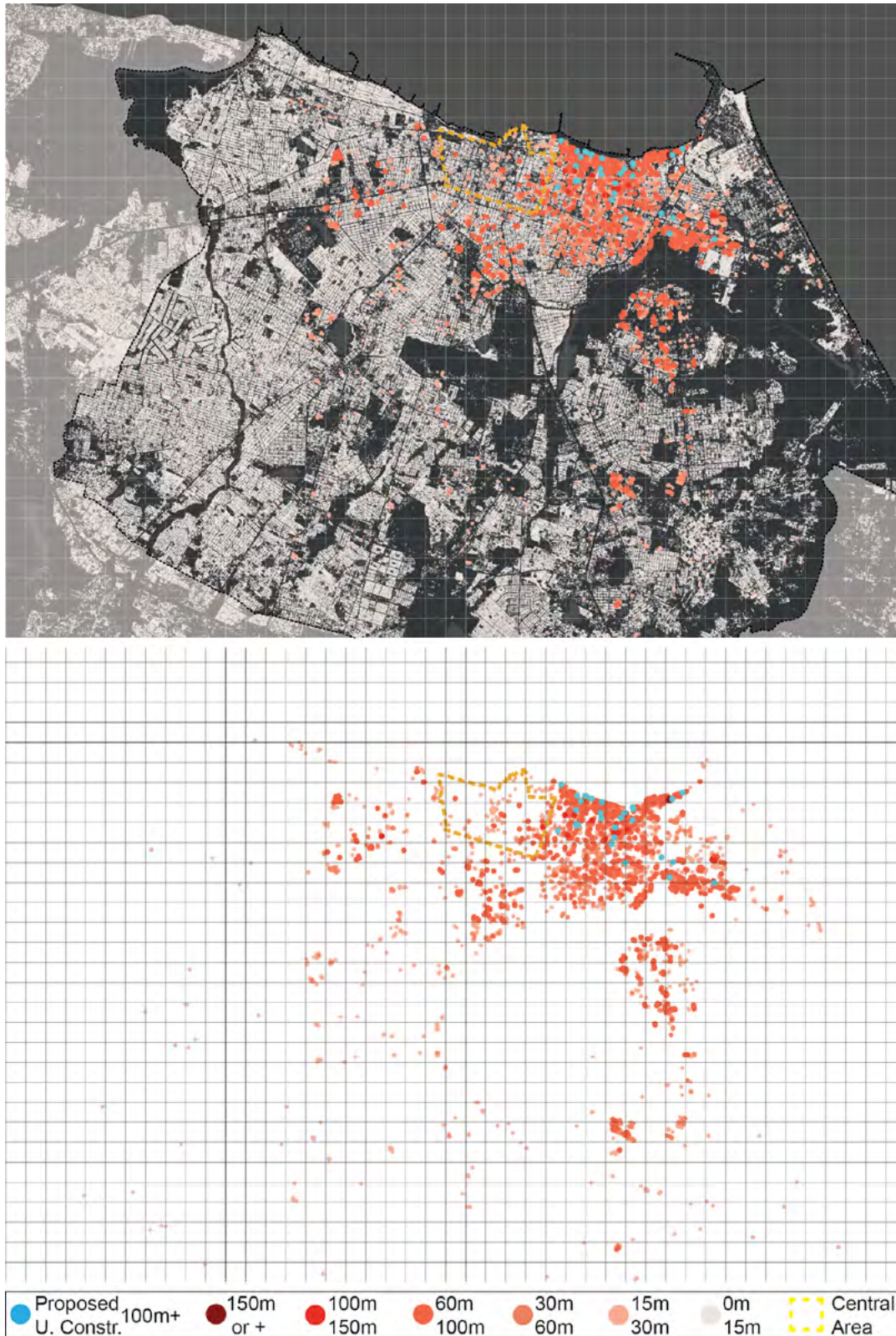


Figure 13. Distribution of buildings of varying heights across the municipality of Fortaleza.



Figure 14. Distribution of buildings of varying heights across the municipality of Belém.

"The recurrence of the dispersion pattern suggests the presence of shared urban planning mechanisms capable of influencing the distribution of high-rise buildings throughout Brazil's urban areas."

proportion ranging in height from 30 to 60 meters (558 buildings) and from 60 to 150 meters (65 buildings). However, in contrast to the observations made in other cities, these buildings are dispersed throughout various urban sectors, exhibiting no discernible vertical clustering. Despite its substantial inventory of medium- and high-rise buildings, the city has yet to establish concentrations that can effectively influence the urban form or generate identifiable vertical centers.

Consequently, Belém offers the most salient illustration of the dispersed model among the cities examined. The defining characteristic of this case is not the number or height of the buildings, but rather the manner in which they are distributed across the territory. This results in widespread vertical development without any predominant areas of concentration.

Comparative Analysis Summary

A comparative analysis of cities reveals that high-rise development in Brazil exhibits distinct patterns of territorial distribution, combining—to

varying degrees—characteristics of concentrated, dispersed, and linear models. However, a recurrent theme emerges in the cases examined: the tendency for high-rise buildings to be dispersed throughout the urban area.

Of the six cases that were studied, dispersion was observed in five of them, either as a predominant characteristic or in association with other spatial distribution patterns. Even in cities with significant concentrations of high-rise buildings, such as São Paulo and Rio de Janeiro, a gradual expansion of vertical development into different urban sectors can be observed, resulting in broader and more fragmented vertical clusters. In Goiânia, Fortaleza, and Belém, this phenomenon is particularly pronounced, establishing a predominant model of territorial organization for high-rise buildings.

The recurrence of this characteristic in cities with such distinct territorial, economic, demographic, and geographic contexts suggests that the dispersion of high-rise development cannot be explained solely by the local particularities of each municipality. Conversely, the recurrence of this pattern suggests the presence of shared urban planning mechanisms capable of influencing the distribution of high-rise buildings throughout Brazil's urban areas.

In this regard, comprehending the pervasiveness of dispersed *verticalização* necessitates an examination that extends beyond the mere analysis of buildings. It is imperative to delve into the regulatory mechanisms that govern their development. The urban form is not merely an epiphenomenon of the real estate market or the physical characteristics of cities; rather, it is directly related to the urban planning regulations that guide land use. Consequently, a thorough examination of these mechanisms is imperative to elucidate the underlying reasons why such disparate urban centers ultimately manifest urban landscapes that exhibit analogous spatial patterns.



4.0

Zoning and The Shaping of Urban Form

The logic of “zoning” has led to the establishment of city plans as the primary planning instruments for urban development and expansion policies in Brazilian municipalities. The objective of these policies is to guide the orderly growth of urban areas. These instruments function as strategic plans capable of establishing general guidelines for other regulatory mechanisms, such as legislation on land use and occupation, zoning, urban mobility, housing, infrastructure, and the environment.¹²

In Brazil, the adoption of “zoning” as an urban planning tool emerged primarily in the 1940s and 1950s, drawing significant influence from the American zoning model. In metropolitan areas such as São Paulo, its implementation was associated with the necessity to manage the changes brought about by the intense process of urbanization and high-rise development that was occurring at that time.¹³ Concurrently, urban planning instruments were developed to address the ramifications of heightened building density, vehicular traffic, and demands for urban infrastructure.⁵

In this context, zoning commenced its operation through the delineation of zones subject to specific regulatory parameters—residential, commercial, industrial, or mixed-use—corresponding to building

parameters capable of regulating the dimensions, elevation, and proportions of structures. The planning approach based on “zoning” thus consolidated a prescriptive logic of development “by right,” in which prior compliance with urban planning parameters automatically guarantees the possibility of construction.¹⁴ This model offers enhanced legal and economic predictability within the real estate market by establishing explicit and mandatory guidelines for urban development.

However, the prescriptive nature of zoning also exerts direct impacts on urban morphology, the landscape, mobility, and urban infrastructure.¹⁴ In the Brazilian context, the effects of this model extend beyond the physical dimension of the urban form. In the city of São Paulo, the implementation of urban planning instruments, often in conjunction with zoning regulations, has played a pivotal role in the formation of a socially segregated urban landscape. This has led to processes of real estate appreciation and the displacement of the most vulnerable populations to peripheral areas of the urban territory.^{3, 13}

A significant portion of these issues can be traced back to the fundamental framework surrounding the development of Brazilian city plans. The distribution

of construction potential across the territory is considered homogeneous, based on the expectation that the city will develop in a continuous and balanced manner over time. However, urbanization occurs in a fragmented, incremental manner and is influenced by economic and real estate dynamics, resulting in the partial realization of the objectives outlined by urban planning instruments within the urban space.¹²

Historically, Brazilian city plans have primarily focused on controlling the functional and quantitative aspects of urban development—lot size, land use, and building density—without effectively addressing the spatial and environmental quality of the resulting city.² Moreover, the absence of urban indicators and the protracted periods between city plan revisions impede the capacity of urban planning instruments to adapt to the unceasing transformations of the contemporary city.¹²

Furthermore, city plans operate primarily on two scales: the broad municipal scale, represented

by large urban areas, and the private scale of the individual lot, where building height, setbacks, floor area ratio, and building potential are defined. The intermediate scale of public space—comprising the block, the street, and public spaces—often lacks effective mechanisms for urban coordination.¹²

The Idealization of the Complete City

In the pursuit of an optimal urban density level, Brazilian city plans inherently employ the notion of a “complete city,” which entails a balanced integration of urban infrastructure and land-use intensity across the urban landscape (see Figure 15).¹² In this model, urban planning instruments primarily function by allocating building density ratios, without necessarily establishing urban indicators capable of effectively measuring the spatial, environmental, or infrastructural performance of the resulting city.¹² The extant literature on urban density has established a correlation between this concept and the relationship between people, buildings, services, and specific areas of the

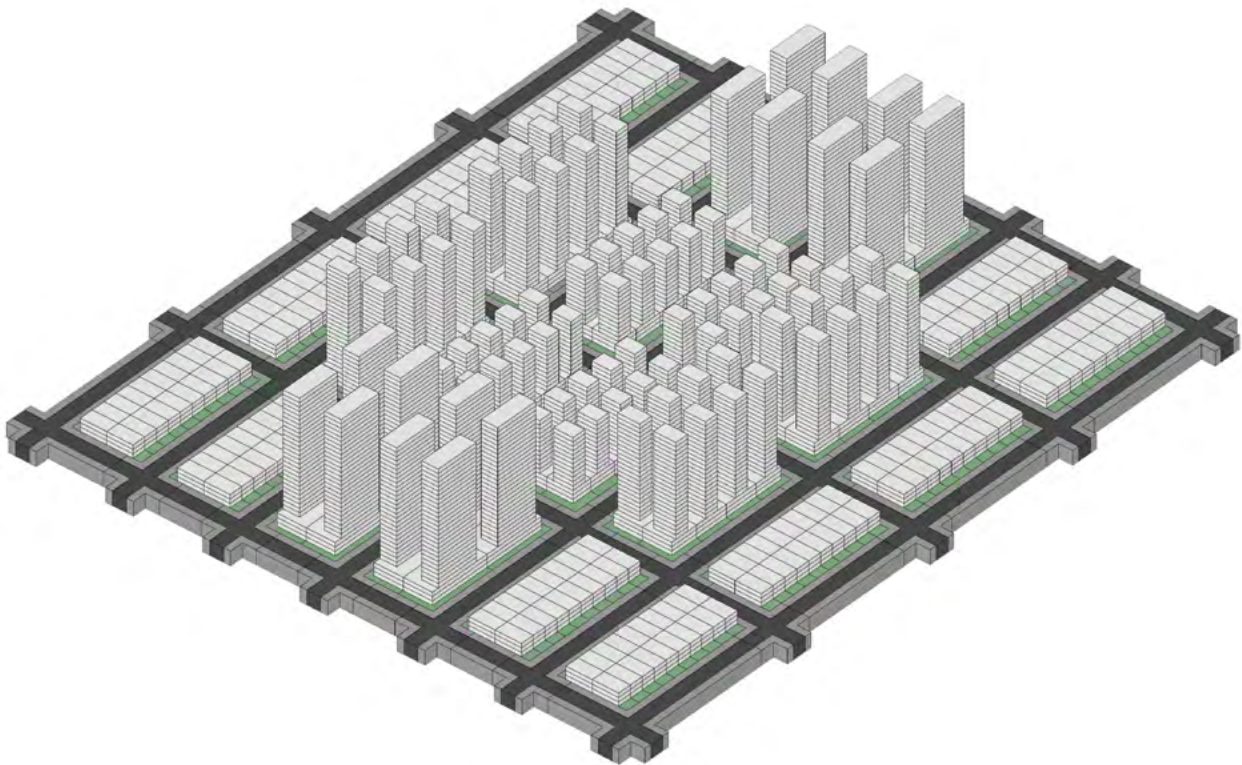


Figure 15. Diagram representing the model of the complete city, as envisioned by the city plans.

territory, such as lots, blocks, neighborhoods, or cities. This understanding has led to the incorporation of density indicators in urban planning as instruments for the allocation of infrastructure, public services, and land use for new construction.¹⁵ In this context, both excessive and low density can generate distinct urban problems. While high densities have been shown to result in infrastructure overload, traffic congestion, pollution, and environmental degradation, low densities have been demonstrated to increase the cost of maintaining urban infrastructure and reduce accessibility to services and transportation systems.¹⁵

In an effort to reconcile density and spatial quality, optimal urban performance is thought to be linked to the coordinated relationship between different scales of the urban environment, such as the lot, block, neighborhood, and district.¹⁶ However, in Brazilian city plans, density limits are often correlated solely with the floor area ratios of private lots. This correlation is based on the premise that buildings will fully utilize the construction potential provided for by legislation and will, over time, shape the urban environment envisioned by regulatory instruments.¹²

This logic posits a hypothetical, fully developed city in which building heights, setbacks, land uses, and the relationships between buildings would be progressively finalized until a balanced urban configuration is achieved. However, the discrepancy between the supply of developed land and demographic demand prevents this expectation of completeness from materializing in the urban area.¹²

Consequently, floor area ratios and occupancy rates have emerged as the predominant mechanisms for regulating the utilization of urban lots.² This logic also presupposes the existence—current or future—of urban infrastructure capable of supporting the levels of density prescribed by urban planning legislation.¹⁷ However, the homogeneous distribution of construction potential across extensive urban areas often results in theoretical scenarios of full occupancy yielding density projections that are incompatible with the actual capacity of cities.⁴

Concurrently, the hypothesis that all urban lots will gradually be replaced by larger buildings is confronted with practical limitations related to lot sizes, existing morphological characteristics, and the dynamics of the real estate market itself.¹⁸ Consequently, the urban models delineated by urban planning instruments seldom attain the level of completion envisioned by said instruments.

This phenomenon gives rise to a paradoxical situation in the context of Brazilian urban morphology. While urban planning instruments distribute construction potential in a relatively uniform manner, the actual city takes shape through a fragmented and uneven process, marked by the scattered emergence of high-rise buildings throughout the urban area. *Verticalização* is characterized by its incremental and discontinuous nature, frequently occurring in a manner that is not seamlessly integrated with the effective consolidation of urban density and compatible infrastructure (see Figure 16).¹²

Morphology Induced in the Private Lot

The “top-down” planning of urban land-use and land-occupation regulations has established a set of compliance rules within Brazilian city plans that are strongly tied to private lots. This has had the effect of predetermining the building volumes across much of the urban territory.¹² Consequently, from the consolidation of city blocks

“Floor area ratios and occupancy rates have emerged as the predominant mechanisms for regulating the utilization of urban lots.”

to the configuration of the skyline, the relatively homogeneous distribution of construction potential hinders the contextualization of new developments and contributes to the homogenization of already established urban environments, where pedestrians had previously established their own “sense of place.”¹²

Moreover, the regulations stipulated in Brazilian city plans have traditionally correlated building height with a reduction in the building’s footprint on the lot, primarily through the stipulation of minimum setbacks tied to height. The result is a regulatory logic in which taller buildings tend to correspond to lower land-use intensities, leading to the construction of isolated, vertical towers regardless of the specific morphological characteristics of the urban context.

This urban design approach involves the separation of the built form from pre-existing morphological structures. A body of research on urban morphology

has demonstrated that disparate spatial configurations—including continuous blocks, courtyard buildings, and isolated towers—can attain analogous levels of building density. However, these configurations yield divergent urban outcomes with respect to public space, urban continuity, and the relationship between buildings and streets.¹⁹ In this sense, density must not be conceived as an absolute value; rather, it should be understood as a consequence of the urban form adopted and the manner in which buildings are organized within the territory (see Figure 17).

In the Brazilian context, this regulatory logic became firmly established, particularly through the so-called “Adiron Formula,” which was incorporated into São Paulo’s legislation in the 1970s (see Figure 18). The instrument permitted the progressive expansion of floor area ratios as the lot coverage ratio was reduced, directly incentivizing taller buildings.²⁰ In pragmatic terms,

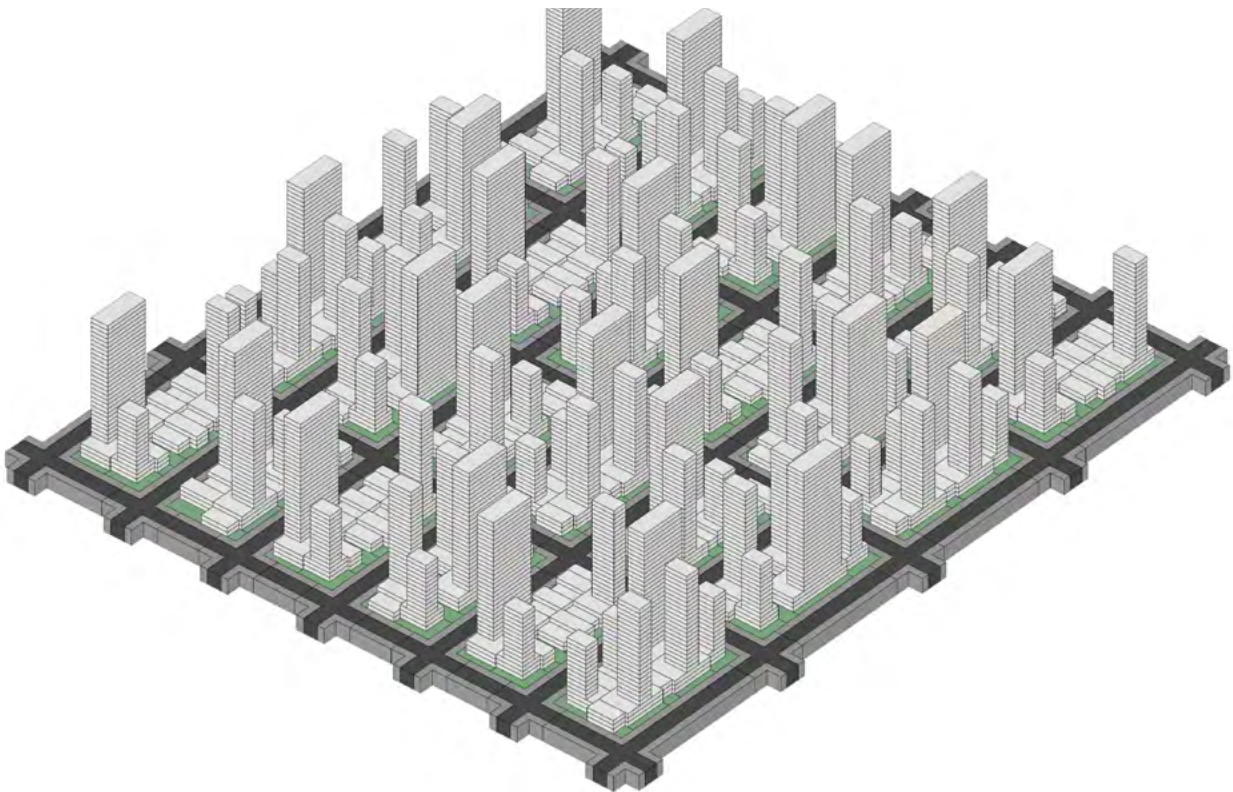


Figure 16. Diagram representing the real city model, with tall buildings “sprouting” in the blocks and promoting a dispersed model of *verticalização*.

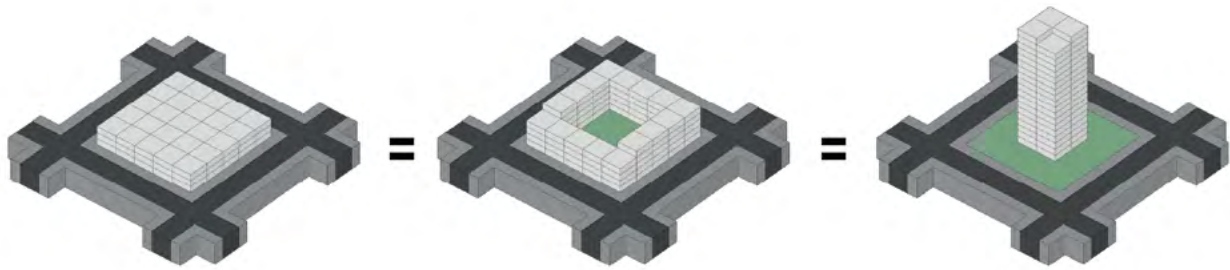


Figure 17. Representative diagram showing the same built area in three different morphologies.

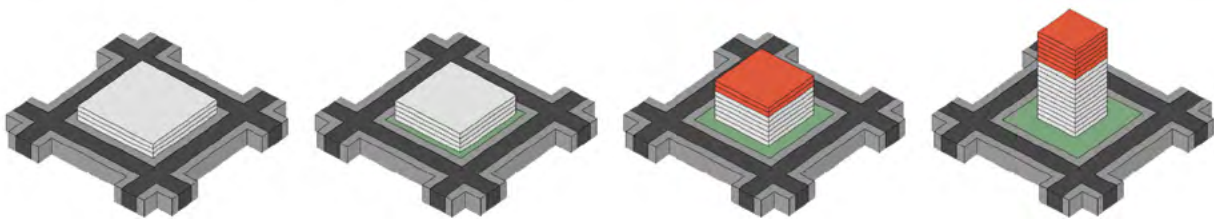


Figure 18. Diagram representing the "Adiron Formula" model. The lower the occupancy rate, the greater the bonus for the utilization coefficient.

the smaller the building's footprint, the greater its potential height and total floor area.

The implementation of this mechanism resulted in the construction of tall, slender buildings set back from property lines and situated as autonomous structures within the lots. Consequently, vertical development no longer aligns with the characteristics of the existing urban fabric. Instead, it adheres predominantly to a mathematical logic based on the relationship between construction potential and land use.²⁰

While these mechanisms were often justified by concerns related to ventilation, sunlight, and environmental quality, the mere creation of open spaces between buildings did not necessarily ensure the quality of the resulting urban space. The fragmentation of setbacks produced residual open spaces that were often disconnected from one another and isolated from the structure of the urban public space.²

Despite the discrepancies between the urban planning city plans adopted by these cities, urban planning tools remain firmly anchored to generic formulas based on mathematical indices that have been in use since the mid-20th century. The

prevailing expectation of ensuring urban quality through abstract control of building volume often disregards the relationship between built form, public space, and the established urban fabric (see **Figure 19**).²

In this context, the city undergoes transformation through the asynchronous layering of buildings

"Density must not be conceived as an absolute value; rather, it should be understood as a consequence of the urban form adopted and the manner in which buildings are organized within the territory."

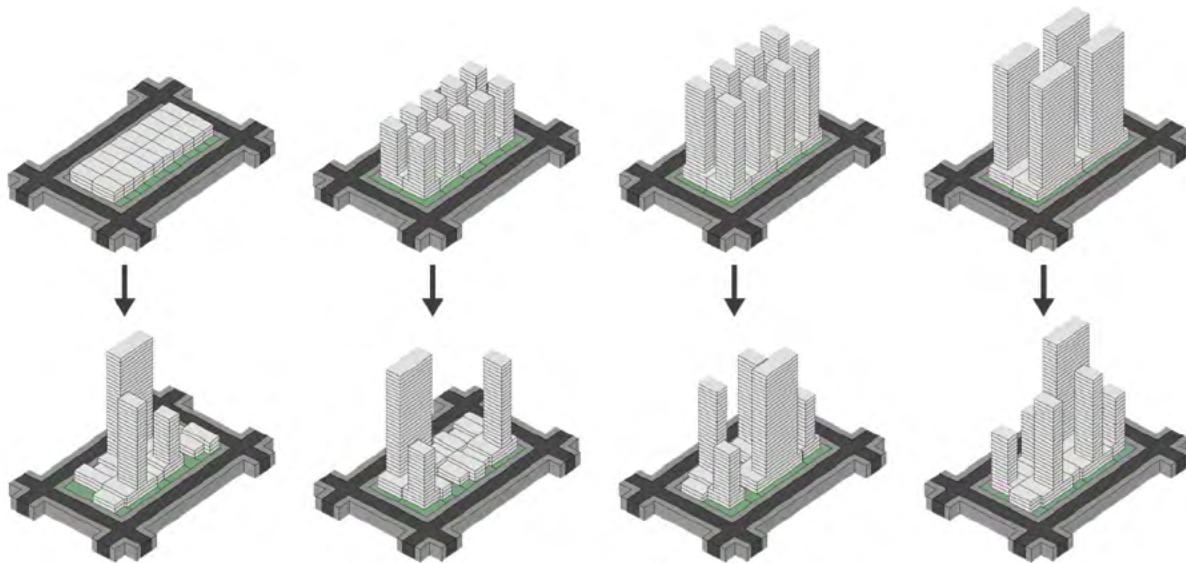


Figure 19. Diagram representing models of city block patterns as envisioned in city plans and of the actual city block patterns.

constructed lot by lot, creating urban landscapes marked by different temporalities, forms, and scales of construction.¹² The absence of effective coordination among urban transformations engenders a fragmented and unpredictable environment, which has been described as a “spatial salad” of urban forms, both at the street scale and in the composition of the urban skyline.²¹

Concurrently, central districts that boast superior urban infrastructure frequently impede the erection of new high-rise buildings, a phenomenon attributable to a paucity of ample parcels and the existence of stringent heritage and regulatory constraints. Consequently, high-rise development is increasingly shifting to peripheral areas or less established urban sectors, even in the presence of inadequate existing urban infrastructure.¹²

Consequently, the underutilization of urban infrastructure occurs in conjunction with the underutilization of the construction potential stipulated in urban planning legislation. The city envisioned by city plans rarely materializes, since not all lots are developed simultaneously and urban planning regulations themselves often

change before the initially envisioned urban form can fully take shape.¹²

In this context, efforts to regulate urban form exclusively through the imposition of regulations on individual parcels of land demonstrate considerable constraints when confronted with the variability inherent in contemporary urban development. The absence of mechanisms capable of coordinating urban transformations at an intermediate scale impedes the establishment of more coordinated relationships between buildings, blocks, and public spaces.

In this context, the impact of urban planning regulations on the urban form becomes particularly evident when examining different Brazilian state capitals. Despite the distinct climatic, cultural, and territorial conditions found in cities such as Curitiba, São Paulo, Goiânia, Fortaleza, and Belém, it is possible to identify a recurring pattern of tall, prismatic buildings constructed according to similar urban planning regulations (see Figure 20). The reiteration of these typologies underscores a dichotomy between the heterogeneity of Brazilian urban contexts and the relative homogeneity of the morphological solutions engendered by urban planning instruments.



Figure 20. Skylines of, from top to bottom, Curitiba, São Paulo, Goiânia, Fortaleza and Belém.



5.0

Homogenization of The Brazilian Skyline

The gradual transformation of perceptions regarding the urban skyline in Brazilian cities throughout the second half of the 20th century was precipitated by the expansion of high-rise construction. In contrast to the American model, which is historically associated with the concentration of skyscrapers in defined central areas, Brazilian *verticalização* began to consolidate diffuse skylines, marked by the dispersion of high-rise buildings across different sectors of cities.²² This phenomenon can be observed in the capitals previously mentioned (see Figure 21). Despite the climatic, cultural, and territorial differences between these capitals, their urban skylines have gradually come to share similar characteristics, marked by the prevalence of prismatic buildings and the continuity of the skyline. Consequently, a homogeneous visual appearance is exhibited by different skylines, which now share a visually similar appearance, despite the considerable

differences that would previously have been observed among distinct urban landscapes.

When the silhouettes are placed side by side, a striking resemblance becomes evident among these five cities, located in disparate regions of a country characterized by continental dimensions. The topographical features of each landscape, including their flat skylines,²³ enable the identification of unifying characteristics among the various panoramas, thereby suggesting an overarching urban quality to the region. Consequently, the *verticalização* process in Brazil has also led to a disregard for the visual impacts on the urban landscape caused by the random placement of high-rise buildings. Consequently, significant visual corridors are impeded, and the landscape undergoes a progressive “walling-in” process (see Figure 22).

“Brazilian *verticalização* began to consolidate diffuse skylines, marked by the dispersion of high-rise buildings across different sectors of cities.”



CURITIBA



SÃO PAULO



GOIÂNIA



FORTALEZA



BELÉM

Figure 21. Skylines and silhouettes of Curitiba, São Paulo, Goiânia, Fortaleza and Belém.



Figure 22. Skyline and side-by-side silhouette of Curitiba, São Paulo, Goiânia, Fortaleza, and Belém.

The homogeneous skyline observed in Brazilian cities reveals a contradiction between the apparent continuity of the urban silhouette and the morphological heterogeneity perceived in plan view (see Figure 23). Even though the horizon landscape may appear to be relatively uniform from a distance, its composition is the result of volumetric layouts determined by normative calculations of height and setbacks. In these layouts, the open spaces between buildings are predominantly quantified but scarcely qualified.² The diffuse skyline that results from this logic becomes, in reality, a confusing and chaotic landscape as it disperses across the urban territory, through rules that horizontalize the horizon line.²²

The dispersed arrangement of high-rise buildings throughout the urban area also serves to diminish the visual hierarchy between urban centers and landmarks. In contrast to the consolidation of clearly identifiable landmarks in the landscape, the distribution of similar volumes throughout the city by *verticalização* hinders pedestrians' ability to comprehend the urban structure.²⁴ The vertical landscape undergoes a transition, marked by a progressive diminution in the intensity of its centrality. This transition gives rise to the emergence of continuous horizons; wherein different regions of the city begin to visually resemble one another.

Despite the increasing prevalence of high-rise buildings, their distribution across the territory mitigates the perception of vertical concentration. Consequently, Brazilian *verticalização* gives rise to cities that exhibit a combination of vertical and

horizontal urban development, characterized by a dispersed distribution of height throughout the urban fabric, without the establishment of clearly defined vertical centers.^{3, 22}

The homogenization of the Brazilian skyline is indicative of a process of *verticalização* that reduces the morphological distinctiveness between cities and undermines the creation of distinctive urban landscapes. This phenomenon signifies more than a mere alteration of the horizon line; rather, it symbolizes the consolidation of an urbanization logic characterized by territorial dispersion, typological repetition, and the progressive loss of legibility in contemporary urban landscapes.^{2, 22}

"The dispersed arrangement of high-rise buildings throughout the urban area serves to diminish the visual hierarchy between urban centers and landmarks."

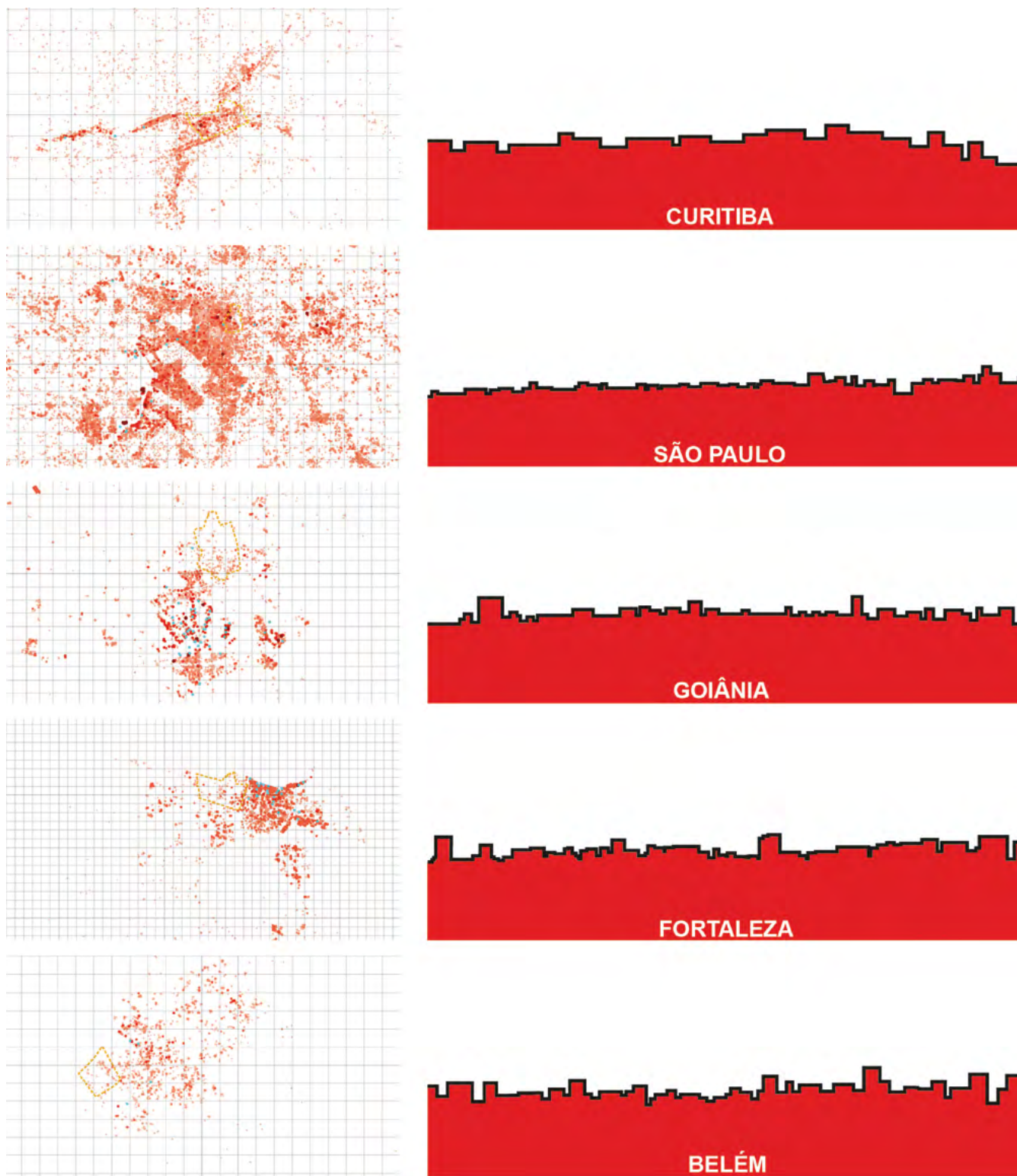


Figure 23. Diagrams of the *verticalização* model and the silhouettes of Curitiba, São Paulo, Goiânia, Fortaleza, and Belém.



6.0

The Case of Balneário Camboriú

In recent decades, high-rise development in Brazil has been characterized by dispersed patterns of land use. As previously demonstrated in the case studies, the proliferation of high-rise buildings occurred in a dispersed manner, extending across various neighborhoods and urban sectors. Consequently, the development of urban centers has become more horizontal, accompanied by a gradual decline in the visual hierarchy of these centers.

Balneário Camboriú, however, defies this trend. Situated along the northern coastline of the state of Santa Catarina, this municipality boasts a population of just over 150,000 permanent residents and currently boasts seven of Brazil's 10 tallest buildings, both completed and under construction. The presence of buildings exceeding 250, and soon 500 meters in height—with the Senna Tower currently under construction—brings to a medium-sized city a characteristic historically associated with major metropolises, making Balneário Camboriú one of the most unique examples of contemporary vertical development, not only in Brazil but worldwide (see Figure 24).

The municipality's distinctiveness, however, is not solely attributable to the height of its buildings. The presence of the country's tallest buildings in a medium-sized city suggests the existence of territorial, demographic, economic, and urban factors that differ from those observed in the cases previously analyzed. A comprehensive understanding of this phenomenon necessitates a departure from rudimentary observations of building height and entry into an in-depth investigation of the characteristics that contributed to the consolidation of this urban model.

In this regard, the case of Balneário Camboriú provides a crucial opportunity to explore a central issue in understanding contemporary vertical development in Brazil: the reasons behind a medium-sized city concentrating a significant portion of the country's tallest buildings. The response to this inquiry necessitates a collaborative examination of the municipality's geographical attributes, its population's temporal variations in size and composition, and the urban planning instruments that have directed its evolution over the preceding decades.

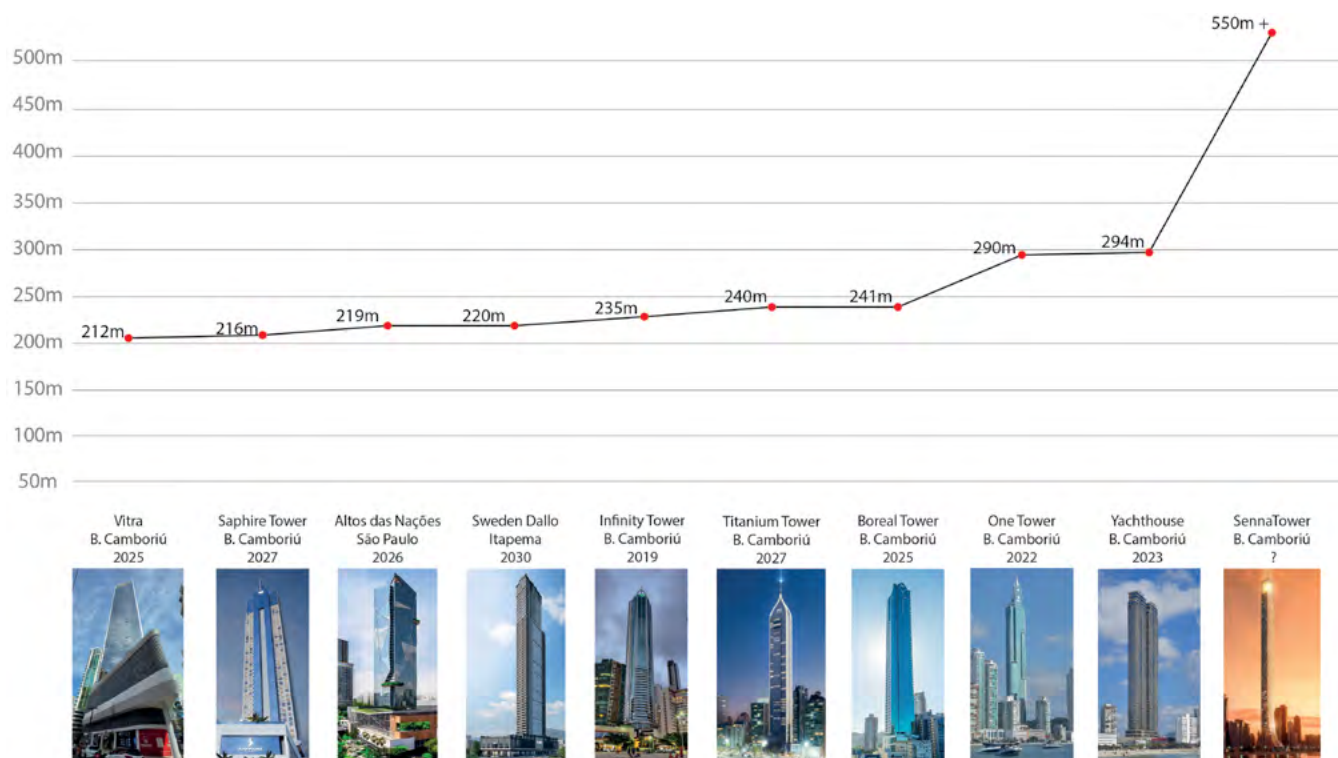


Figure 24. Chart showing the heights of the 10 tallest skyscrapers—completed and/or under construction—in Brazil today. (Source: chart created by the author. Images ©Talls Solutions, FG Empreedimentos, Dallo and WTorre).

Geographical, Demographic, and Economic Factors

The emergence of Balneário Camboriú as Brazil's leading hub for high-rise buildings is linked to a set of geographical, demographic, and economic factors that set the municipality apart from most Brazilian cities. The increase in high-rise construction is not solely the result of urban planning regulations; rather, it is a combination of limited land availability, high tourist appeal, strong seasonal demand, and one of the country's most valuable real estate markets.

From a territorial perspective, Balneário Camboriú has a municipal area of 45,214 square kilometers.²⁵ Of this total, approximately 16.9 square kilometers (37,4%) is urbanized,²⁶ while the remainder of the territory consists of hills, environmentally protected areas, waterways, and the Atlantic Ocean itself. This circumstance imposes substantial constraints on the city's capacity for uninterrupted horizontal expansion, thereby allocating a considerable share

of the pressure for growth to areas that are already urbanized (see Figure 25).

The physical limitations of the territory become even more significant when viewed in conjunction with the city's population dynamics. According to estimates by the Brazilian Institute of Geography and Statistics (IBGE), the population of Balneário Camboriú is approximately 151,000 inhabitants.²⁵ However, the city receives approximately 3.7 million tourists per year,²⁷ and during peak seasonal periods between December and January, the population present in the municipality can exceed one million people.²⁷ The pressure exerted by this temporary population has been shown to significantly increase the demand for housing, lodging, commerce, services, mobility, and urban infrastructure. This has resulted in a level of urban use that is unusual for municipalities of similar size.

The origin of this dynamic is directly linked to the process of establishing Balneário Camboriú as a tourist destination. Beginning in the early decades

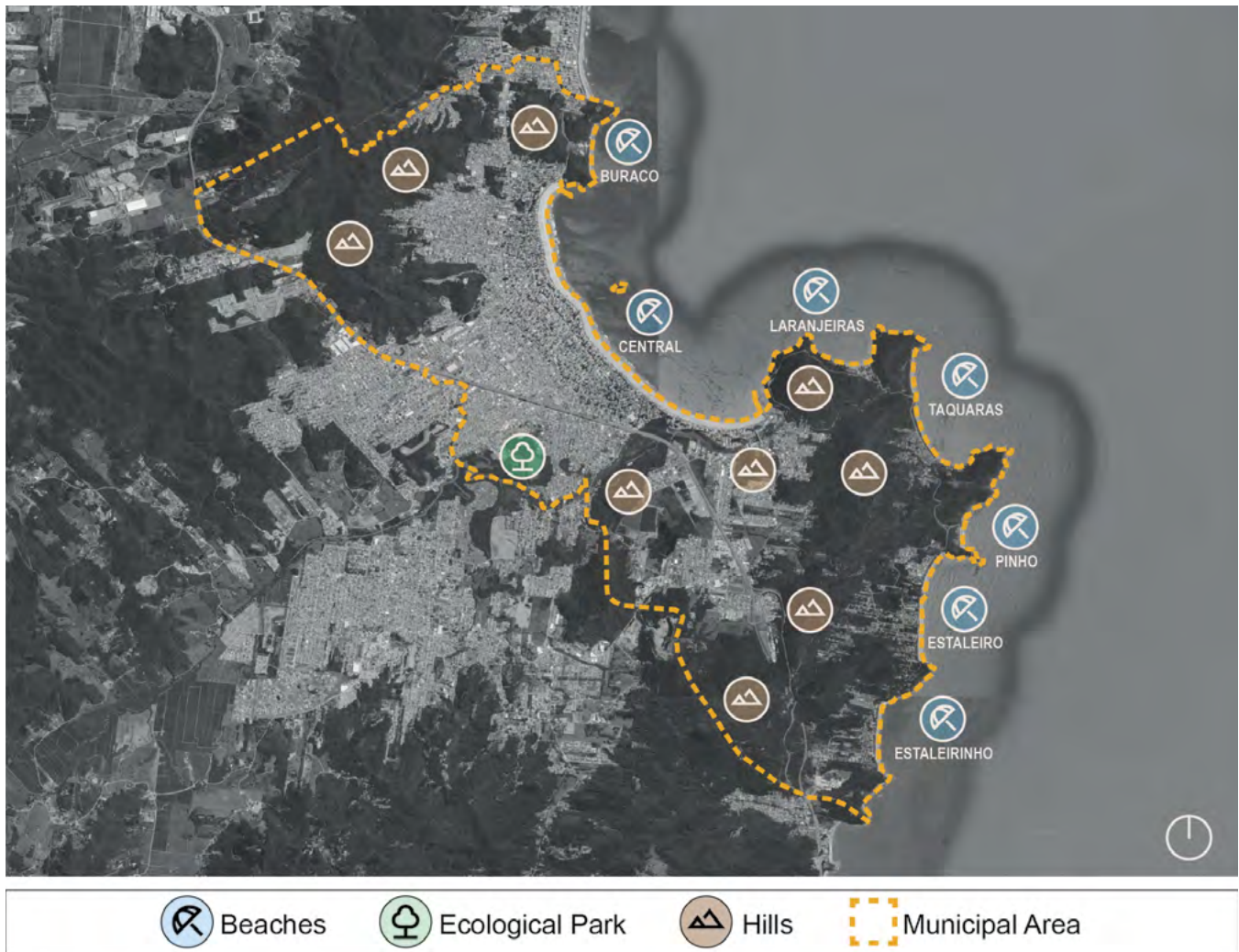


Figure 25. Map of the Balneário Camboriú municipal area, showing the region's geographic constraints.

of the 20th century, Praia Central began attracting visitors primarily from the Itajaí Valley, thereby establishing a connection between tourism, summer vacations, and real estate appreciation that endures to the present day.²⁸ The city's incorporation in 1964 and the subsequent construction of the BR-101 highway in the following decade led to significant improvements in the city's regional and national accessibility, thereby solidifying its reputation as a tourist destination and catalyzing the expansion of the real estate market.²⁹

The pressure on the area is exacerbated by the high value of urban land. Balneário Camboriú currently

has one of the most expensive real estate markets in Brazil. While the average price per square meter for residential properties is among the highest in the country, units located on Avenida Atlântica (along the waterfront) exceed R\$ 50,000/m² (US\$ 9,760/m²), and can surpass R\$ 100,000/m² (US\$19,530/m²) in new developments and ultra-luxury properties³⁰.³¹ The confluence of factors, including the relative scarcity of developable land, the area's high tourist appeal, and the strong demand for real estate, has led to the transformation of urban land into an asset of extremely high economic value. This, in turn, has prompted the development of solutions aimed at maximizing the use of available land.

The consequences of this dynamic extend beyond the city limits. The exorbitant cost of housing has led to a significant migration of workers from neighboring municipalities to Balneário Camboriú, thereby increasing the daily flow of commuters to cities such as Camboriú, Itajaí, and Itapema.^{32, 33} Concurrently, the city is consolidating its position as a regional nexus for services, commerce, tourism, and real estate investment, thereby extending its sphere of influence well beyond its officially registered population.

However, the phenomenon of real estate appreciation alone does not provide a comprehensive explanation for the observed process in Balneário Camboriú. The confluence of factors, including the limited availability of land, the intense competition for space due to seasonal variations, the substantial demand for the area, and the vigorous economic activity engendered conditions that were particularly conducive to the intensification of urban land use and the construction of high-rise buildings. These factors contribute to the municipality's distinction as a leading hub for high-rise buildings, setting itself apart from the pattern observed in most Brazilian cities. The distinctiveness of this process is further underscored by the manner in which these edifices are dispersed across the expanse, and the urban planning instruments that have contributed to their consolidation over the past few decades.

Geographical Distribution of High-Rise Buildings

The geographical distribution of high-rise buildings in Balneário Camboriú differs substantially from the patterns observed in the cities analyzed previously. While São Paulo, Rio de Janeiro, Goiânia, Fortaleza, and Belém exhibit varying degrees of territorial dispersion of high-rise development, this municipality in Santa Catarina is characterized by a strong spatial concentration of high-rise buildings within a small portion of its urbanized area. The maps show that most buildings taller than 15 meters are located in the neighborhoods along Praia Central, forming a continuous and clearly defined vertical cluster within the territory (see Figure 26).

The quantitative data substantiates this finding (see Table 2). In the other cities examined, buildings up to 15 meters tall comprise between 97% and

99% of the total built stock. In Balneário Camboriú, however, this proportion is reduced to 89.64%. In contrast, a greater percentage of the buildings (10,36%) in the municipality exceed 15 meters in height, a percentage that is significantly higher than that observed in the other cases analyzed. This discrepancy underscores the notion that vertical development is not confined to a limited number of isolated projects or a modest selection of exceptional buildings. Instead, it emerges as a fundamental characteristic of the local urban fabric.

The distribution by height range further corroborates this interpretation. A total of 1,641 (4.73%) buildings were identified between 15 and 30 meters, 1,528 (4.41%) between 30 and 60 meters, 281 (0.81%) between 60 and 100 meters, 63 (0.18%) between 100 and 150 meters, and 56 (0.16%) over 150 meters. A total of 3,569 buildings exceed 15 meters in height, constituting an unusual collection of medium- and high-rise buildings for a municipality with a population of just over 150,000 permanent residents. In contrast to the other cities examined, where high-rise construction constitutes a relatively minor proportion of the total building stock, in Balneário Camboriú it has emerged as a prevailing characteristic of the established urban landscape.

A sequential analysis of the different height ranges reveals a particularly significant characteristic. In most Brazilian cities, the tallest buildings tend to emerge progressively in new neighborhoods and urban sectors, thereby expanding the geographical footprint of high-rise development. A contrasting trend is observed in Balneário Camboriú. As urban areas experience increased vertical development, their geographical distribution becomes increasingly concentrated. The analysis revealed that buildings between 60 and 100 meters, between 100 and 150 meters, and over 150 meters occupy virtually the same sectors that previously concentrated lower-rise buildings. This finding indicates a continuous process of land-use intensification within the same urban area.

This logic is further exemplified by the strategic placement of current and planned developments with heights exceeding 100 meters. In contrast to the patterns observed in other cities, where new developments frequently indicate an expansion of high-rise construction into novel urban areas,

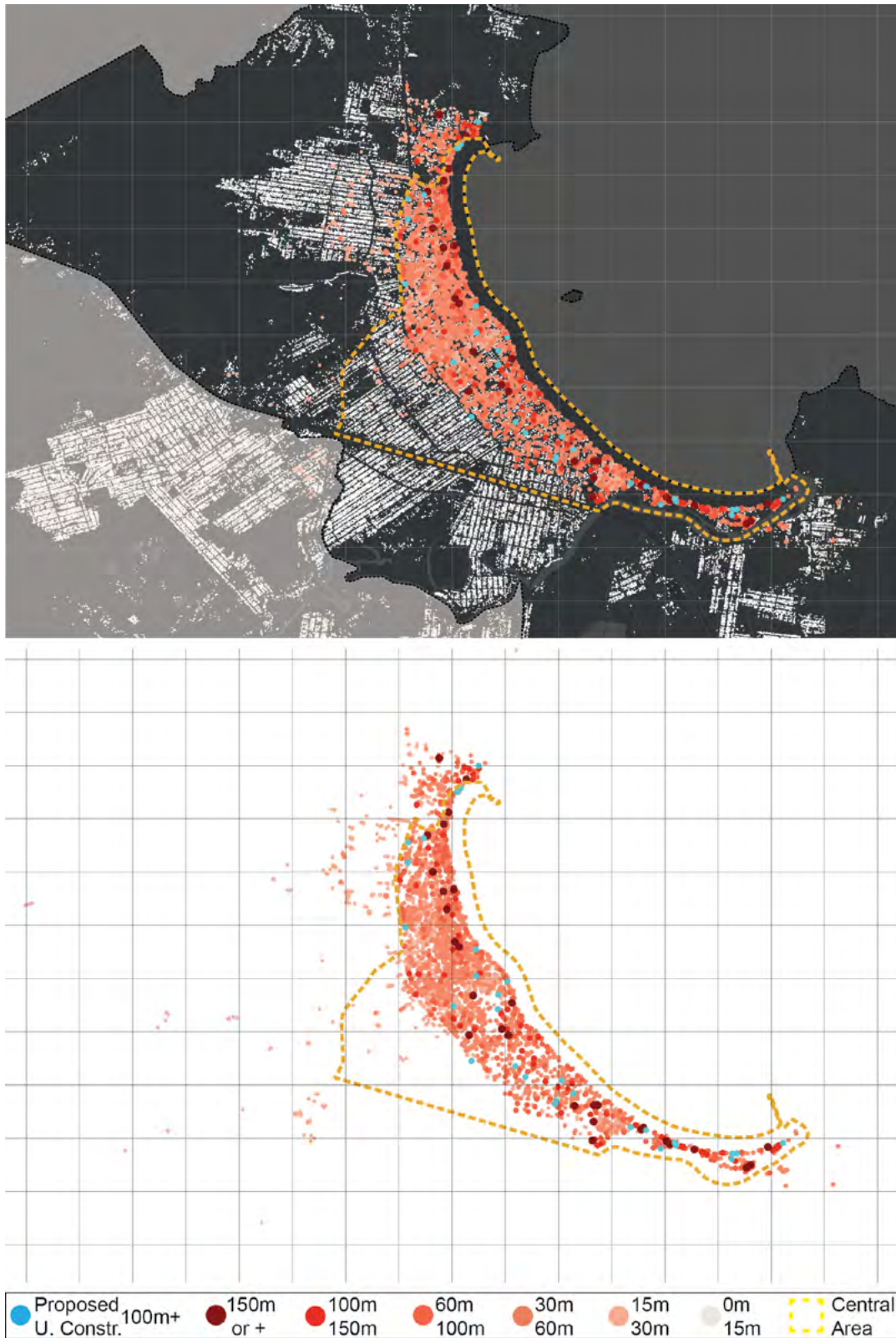


Figure 26. Distribution of buildings of varying heights across the municipality of Balneário Camboriú.

City	Height Type	0–15 m	15–30 m	30–60 m	60–100 m	100–150 m	>150 m	Proposed / Under Construction (100 m+)	Total
Balneário Camboriú	Count	31,115	1,641	1,528	281	63	56	29	34,713
	Proportion	89.64%	4.73%	4.40%	0.81%	0.18%	0.16%	0.08%	100.00%

Table 2. Number and distribution of buildings of varying heights in Balneário Camboriú.

future projects in Balneário Camboriú remain concentrated within the same sectors that already contain most existing buildings. The persistence of this pattern indicates that the observed concentration is not merely a temporary phase of local urban development, but rather a structural characteristic of how the city has developed its vertical growth over the past few decades.

A total of 29 buildings with a height exceeding 100 meters have been identified as currently under construction or in the planning phase within the municipality. This body of research indicates that the vertical expansion of Balneário Camboriú is not a completed process or one restricted to a specific cycle of the real estate market. Despite having achieved the distinction of hosting the highest concentration of tall buildings in the country, the city persists in the development of new high-rise projects at a rate that enables continuous transformation of its urban landscape. Among the projects under development, the Senna Tower is particularly noteworthy (see Figure 27). With a projected height exceeding 550 meters, it signifies

a new milestone in the vertical expansion of Brazil. The architectural design of the structure serves as a visual representation of the ongoing and escalating nature of this process. The concurrent existence of numerous edifices exceeding 100 meters in height serves to underscore the notion that vertical expansion continues to serve as a pivotal catalyst in the urban metamorphosis of the city.

The outcome of this initiative is the establishment of one of the nation's most substantial concentrations of high-rise buildings within a relatively compact geographical area. Balneário Camboriú is a city that is distinguished by its exceptionally tall buildings. However, it also represents an urban model that is distinct from the one that predominates in Brazil. While the *verticalização* observed in the cities analyzed tends to disperse across the territory over time, the case in Santa Catarina highlights a simultaneous process of concentration and intensification of high-rise buildings. To comprehend the origins of this configuration, it is necessary to transcend the limitations imposed by territorial, demographic, and economic factors. Instead, an analysis of the urban planning instruments that guided land use and the distribution of development potential throughout the city's evolution is required.

Urban Planning Instruments

The territorial concentration of high-rise development observed in Balneário Camboriú is also linked to the urban planning decisions adopted by the municipality over the past few decades. While most Brazilian cities began to distribute construction potential relatively evenly across their urban areas, Balneário Camboriú consistently maintained the highest floor area ratios precisely in the areas that already concentrated infrastructure, economic activities, and real estate demand.

In addition to territorial concentration, the intensity of the permitted urban development indices in the city

"The city persists in the development of new high-rise projects at a rate that enables continuous transformation of its urban landscape."



Figure 27. Senna Tower, integrated into the Balneário Camboriú skyline.

center is noteworthy. The combination of specific instruments—floor area ratio, land use permits with fees, and incentives—resulted in high construction potential (see Figure 28). Coupled with robust real estate demand and a relative scarcity of developable land, these conditions enabled the construction of buildings significantly taller than those found in most Brazilian municipalities. In this context, *verticalização* was not merely a gradual increase in built-up density; rather, it initiated successive cycles of intensified urban land use.³⁴

Another salient aspect of this process was the utilization of the paid-for grant of building rights as an urban financing instrument. The possibility of acquiring additional building potential in exchange for financial contributions enabled a portion of the real-estate appreciation generated by the urban development itself to be redistributed to the government.³⁴ The significance of this mechanism, however, lies not only in capturing a portion of this appreciation, but also in allocating the collected

funds toward investment in infrastructure, mobility, urban improvement, and public spaces, thereby establishing a direct link between real estate growth and urban transformation.

This model thus establishes a direct correlation between real estate development and urban investment. As new developments are incorporated into the city center, the municipality's capacity to invest in infrastructure, mobility, urban improvement, and public spaces also expands.³⁴ The development of high-rise buildings has evolved from being a mere byproduct of economic growth to a strategic instrument in the financial engineering of urban transformation.

Consequently, urban planning instruments not only facilitated the construction of taller buildings but also exerted a direct influence on the city's developmental trajectory. The concentration of development potential, in conjunction with urban financing mechanisms and robust demand for

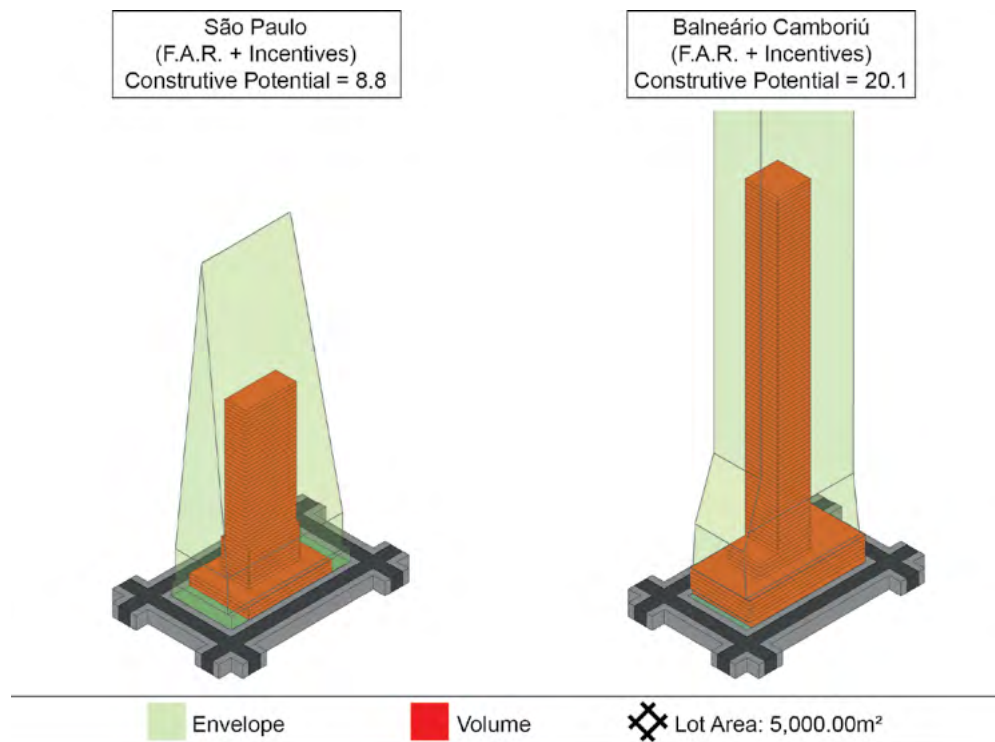


Figure 28. Simulation comparing the construction potential of the same lot based on the zoning regulations of São Paulo and Balneário Camboriú.

prime locations, contributed to the consolidation of an urban form that is distinct from that observed in the majority of Brazilian cities. This configuration assumes particular pertinence when juxtaposed with the city envisioned by urban planning instruments. While most master plans assume a future state of completeness that is rarely achieved in practice, the case of Balneário Camboriú allows for a discussion of the extent to which the territorial concentration of urbanization has helped bring the actual city closer to the theoretical scenarios imagined by urban planning mechanisms.

The Urban Agenda After Verticalização

The case of Balneário Camboriú demonstrates that the construction of high-rise buildings is not solely contingent upon the permissiveness of urban planning instruments or the dynamics of the real estate market. The confluence of factors, including the scarcity of available land, the robust demand for prime locations, the substantial appreciation in land values, and the concentration of construction potential, has given rise to an urban process that diverges from the patterns observed in the majority

of Brazilian cities. While earlier analyses of case studies have demonstrated a recurring trend toward the territorial dispersion of high-rise development, this municipality in Santa Catarina has consolidated a model based on the progressive intensification of development within a relatively small area of the urban territory (see Figure 29).

The distinctiveness of Balneário Camboriú, therefore, lies not only in its production of an exceptional concentration of high-rise buildings, but also in its advancement of this process to a stage where the urban agenda itself must undergo a transformation in nature. Once vertical development has been established as a structural component of the city, the debate shifts from focusing on the possibility of building tall structures to addressing the ability to improve their urban impacts. These impacts include infrastructure, mobility, public space, livability, housing, landscape, and metropolitan connectivity.

Concurrently, the consolidation of this model does not nullify the urban predicaments associated with the city's expansion. The prevailing pressures on



Figure 29. Skyline from Praia Central of Balneário Camboriú. © Juste Noire / courtesy of Talls Solutions

urban infrastructure, the influx of commuter traffic from neighboring municipalities, the escalating cost of housing, and the ongoing need to enhance public spaces collectively underscore the notion that urban concentration does not inherently address the myriad challenges confronting contemporary cities. The consequences of this phenomenon encompass a range of outcomes, including benefits, opportunities, and challenges. These consequences must be subject to continuous assessment and monitoring.

In this context, the discourse surrounding the future of Balneário Camboriú has undergone a gradual shift from deliberations concerning building heights to matters pertaining to urban quality, mobility, infrastructure, public space, and the city's carrying capacity. This shift in focus has given rise to initiatives aimed at establishing a shared vision for the municipality's upcoming cycles of urban development. Among these, the work of Instituto +BC merits particular attention. This civil society organization comprises representatives

from various sectors within the city and provides technical and strategic support to public authorities. Through collaboration between the private sector, technical expertise, and public management, +BC seeks to contribute to the formulation and implementation of urban projects capable of enhancing the urban environment and expanding the city's capacity to respond to future challenges (see Figure 30).

Balneário Camboriú serves as a prominent case study for examining the interrelationships among vertical development, urban concentration, and the formation of the urban fabric. An examination of the historical evolution of vertical development reveals that its forms are the result of a complex interplay between territorial constraints, economic dynamics, and specific urban planning decisions. In this sense, the municipality offers significant insights into the ongoing discourse on the future directions of Brazilian urban planning and the various ways in which high-rise buildings can contribute to the development of cities.



7.0

Final Considerations

The analysis conducted throughout this study demonstrates that Brazilian *verticalização* exhibits a recurring characteristic: the tendency toward the territorial dispersion of buildings and height. Despite the observed variations among the cities examined, tall buildings seldom coalesce into predominant urban concentrations. Instead, they are dispersed across multiple urban sectors, resulting in landscapes characterized by the territorial fragmentation of vertical development and the progressive homogenization of skylines.

This finding indicates that the observed dispersion cannot be attributed exclusively to market dynamics or the unique characteristics of each city. Instead, it appears to be associated with the manner in which urban planning instruments function within the Brazilian urban environment. Brazilian urban planning has historically prioritized the distribution of construction potential across extensive urban areas. This approach involves the regulation of development on a lot-by-lot basis, utilizing various parameters such as floor area ratios, building coverage ratios, and setback requirements. This regulatory framework has been effective in controlling the intensity of urbanization on individual parcels of land. This phenomenon reveals an apparent paradox: while real estate demand does

not disappear, it is absorbed by an expanding number of lots dispersed throughout the city.

The cases of Rio de Janeiro and Balneário Camboriú illustrate the limitations of this logic. In both cases, geographical constraints have been shown to have a significant impact on the availability of developable land, thereby fostering more intense processes of urban concentration. However, the outcomes resulting from these two factors differ. While the city of Rio de Janeiro exhibits a strong territorial concentration of mid-rise buildings, the city of Balneário Camboriú combines this concentration with an ongoing process of vertical intensification. The comparison suggests that the territory influences where urbanization tends to concentrate, yet urban planning instruments play a decisive role in the urban form resulting from that concentration.

From this perspective, the presence of the country's tallest buildings outside major Brazilian metropolises ceases to be a mere statistical curiosity. This phenomenon underscores the importance of considering diverse patterns of development potential, as they can result in substantially different urban outcomes. While many of the cities we have examined do accommodate real estate demand through the territorial dispersion



Figure 30. The Balneário Camboriú waterfront redevelopment project, funded by the +BC Institute, is currently underway.

of vertical development, other contexts foster successive processes of urban concentration and intensification. Consequently, the height of buildings is determined by the urban form that results, rather than being the primary factor in its development.

The results also underscore the limitations inherent to the urban planning instruments traditionally employed in Brazil. These limitations do not necessarily stem from urban planning regulations, but rather from the expectation that parameters applied to individual lots can, in isolation, yield desirable urban outcomes at broader scales. The urban form observed in the cities analyzed demonstrates that the aggregate of individual decisions does not always result in the spatial configuration envisioned by planning instruments.

This finding also contributes to broadening the debate between rule-based and guideline-based approaches. While rules offer predictability, legal certainty, and control over land use, they tend to focus on the compliance of individual buildings. Consequently, guidelines facilitate the alignment of broader urban objectives with local particularities,

thereby allowing for the incorporation of more adaptable responses.¹⁴ The integration of rules, guidelines, and urban performance criteria has emerged as a promising pathway for coordinating urban transformations at intermediate scales, ranging from the individual plot to the city as a whole.³⁵

Consequently, the discourse surrounding high-rise buildings in Brazil might benefit from a gradual transition, moving from a focus on sheer height to a consideration of urban form. The focus of the debate has shifted from the regulation of building heights to an assessment of the urban forms generated by processes of *verticalização*. In this sense, the central issue is no longer merely the location and extent of construction; rather, it comes to encompass how urban planning instruments guide the spatial distribution of urbanization and the resulting impacts on density, infrastructure, mobility, public space, and urban quality. Consequently, *verticalização* should not be regarded exclusively as a byproduct of urban development; rather, it should be understood as a pivotal factor influencing contemporary urban morphology.

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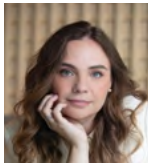
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